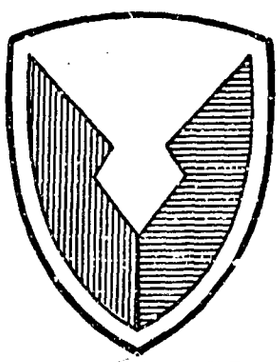
US ARMY TEST & EVALUATION COMMAND



USATECOM PROJECT NO. 8-4-0230-01-F

FINAL REPORT OF COMPARISON TEST OF

RIFLE, 5.56-MM, M16

REPORT NO. DPS-1471

OCTOBER 1964

DEVELOPMENT AND PROOF SERVICES

ABERDEEN PROVING GROUND, MARYLAND

(11) [redacted] OCT 64

(12) 83 p.

DEVELOPMENT AND PROOF SERVICES
ABERDEEN PROVING GROUND, MARYLAND

(9) FINAL REPORT, (6) [redacted] COMPARISON TEST OF

26 May-14 Sep 64, RIFLE, 5.56-MM, M16,

~~RDT&E PROJECT NO. None~~

(16) USATECOM-[redacted]8-4-0230-01-F

(14) Report No. DPS-1471

ANY REQUESTS FOR COPIES OF
THIS REPORT SHOULD BE MADE
TO COMMANDING GENERAL,
US ARMY WEAPONS COMMAND.

[redacted] GEORGE E. HENDRICKS

(10)

FOR THE DIRECTOR:

J. A. TOLEN
Assistant Deputy Director
for Engineering Testing

[redacted]

(111. 875)

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

ABSTRACT

The purpose of this test was to determine if production-line samples of M16 rifles would comply with performance specifications; to detect any design, manufacturing or inspection deficiencies; and to determine the accuracy and the ability of the rifle to function when subjected to automatic-fire roles and under various adverse conditions. The test was conducted between 26 May and 14 September 1964. The rifles produced satisfactory performance except that one rifle had an excessive number of failures to fire semiautomatically (single rounds) in the reliability test.

DEVELOPMENT AND PROOF SERVICES

USATECOM PROJECT NO. 8-4-0230-01-F

FINAL REPORT OF COMPARISON TEST OF

RIFLE, 5.56-MM, M16

26 MAY TO 14 SEPTEMBER 1964

SECTION 1. GENERAL

1.1 REFERENCES

1. USAWECOM Comparison Test Plan, Rifle, 5.56-mm, M16.
2. TECP 700-700, Volume I.
3. Springfield Armory Purchase Description SAPD-253, Acceptance Testing Specification for Rifle, AR15 and Rifle, 5.56-mm, M16, as amended.
4. TM 9-1005-249-14 (Draft), Rifle, 5.56-mm, M16.

1.2 AUTHORITY

This test was authorized by first indorsement to USAWECOM letter, 11 May 1964 (Appendix I).

1.3 OBJECTIVE

This test was conducted to determine if M16 production rifles conform to the performance specification (Reference 3) and as a quality assurance measure to detect any design, manufacturing, or inspection deficiencies that would adversely affect the operation of the rifles.

1.4 RESPONSIBILITIES

Development and Proof Services was responsible for testing and test reporting.

3

1.5 DESCRIPTION OF MATERIEL

The M16 rifle is a lightweight gas-operated rifle chambered for cartridge caliber .223 (5.56-mm); and equipped with a 20-round, detachable magazine. A selector on the left side provides a safety and a choice between semiautomatic and automatic fire. A dust cover is provided to keep foreign matter from entering the operating parts by covering the ejection port in the receiver when the rifle is not in use. Opening of the bolt automatically releases the spring-loaded, hinged dust cover to an out-of-the-way position for firing. The bolt locks in a barrel extension by means of locking lugs. The bolt carrier has a cam cut to accommodate a cam pin assembled in the bolt which rotates the bolt to the locked and unlocked position.

The ammunition used in this test was cartridge, ball, caliber .223 (5.56-mm), lot RA 5027.

Lubricant, PL-special lubricating oil, general purpose, preservative, MIL-L-644B, was used in all phases of testing except the extreme cold, rain, and unlubricated tests. Oil, MIL-L-14107 was used in the extreme cold tests. Lubriplate was used in the rain test and the rifles were fired dry in the unlubricated test.

The riflemen employed in this test each hold a current National Rifle Association Master classification in high-power rifle competition.

1.6 BACKGROUND

Production samples of M16 rifles are subjected to comparison tests in accordance with a continuing program under jurisdiction of the Army Weapons Command to assure the quality of production items and to disclose any major design deficiencies.

1.7 FINDINGS

It was found that:

a. In the machine-rest accuracy test, the average extreme spread of the groups ranged from 2.6 to 3.6 inches.

b. The average extreme spread of groups fired from benchrest at 100 meters was 3.6 inches compared to 3.5 inches when fired from a machine rest at 100 yards using the same rifles.

c. In firing 3-round-burst automatic accuracy at 25 meters from the standing position, the average extreme spread for all shots was 117.2 inches. The average extreme spread for the first shot in each group (aimed shots) was 2.4 inches.

d. In firing 5-round-burst automatic accuracy at 25 meters from the standing position, 9% of all shots missed the 20-foot-high by 12-foot-wide target.

e. In firing 3- and 5-round burst automatic accuracy at 50 meters from the prone position, without the use of artificial support, the average extreme spread was 89.6- and 101.9 inches, respectively.

f. In firing 3- and 5-round-burst automatic accuracy from the hip at 25 meters at an E target, 90 rounds were fired, in 3-round bursts, resulting in 19 hits. A total of 150 rounds was fired in 5-round bursts and 32 hits were obtained.

g. In the combat accuracy test, the average extreme spread was 4.0 inches.

h. In the rate-of-aimed-fire test, automatic fire, compared to semiautomatic fire, resulted in a reduction of the average number of hits obtained by 39.6 per minute, although there was a 14.6 increase in the average number of shots fired per minute.

i. In the reliability test where cleaning and lubrication on rifle No. 040284 was deliberately curtailed, 16 of the 19 malfunctions occurred after firing more than 1000 rounds without cleaning and lubrication. This type of maintenance is usually performed after each 1000 rounds of firing. The effect of lack of cleaning and lubrication on functioning indicates that firing should not be continued beyond 1000 rounds before the rifle is cleaned and lubricated. These malfunctions were not charged against the rifle (ref Table XII, par. 2.13).

The average loss of velocity as a result of the reliability test was 70 fps.

Inspection of the two rifles after the reliability test revealed that one had a damaged bolt ring and the other had a damaged firing pin retaining pin; however, both rifles were operational. Rifle No. 040297 gave an excessive number of failures to fire semiautomatically.

4

j. More efficient cleaning of the rifle could be accomplished if special brushes were provided for cleaning particular areas such as the chamber, the locking lugs in the barrel extension, and the inside of the bolt carrier where carbon accumulation occurs.

k. Satisfactory function was obtained in the following adverse conditions tests:

1) Extreme cold, -65°F.

2) Unlubricated.

3) Interchange.

4) Mud.

5) Dust.

l. In the rain test, 13 failures to fire occurred. Several pieces of brass from a punched-out primer lodged on the firing pin and caused the malfunctions.

m. After being subjected to +125°F and 90% relative humidity for approximately 18 hours, the cam pin rusted and caused extreme difficulty in opening the bolt. After the rifle was made operational, 160 rounds were fired satisfactorily.

n. Weights and measurements of the complete rifle and accessories were as shown in Table I.

Table I. Weights and Measurements

	Rifle No.				
	40048	40219	40250	40284	40297
Over-all length, in.			38.8		
Sight radius, in.			19.8		
Line of sight above bore, in.			2.4		
Firing-pin protrusion, in.	0.034	0.034	0.032	0.034	0.031
Barrel length, in.			20.0		
Butt to trigger, in.			12.8		
Line of sight to heel of butt, in.			2.0		
Rifle without magazine or accessories, lb	6.38	6.40	6.41	6.41	6.40
Empty magazine (average of five), lb			0.184		

Table I (Cont'd)

	Rifle No.				
	40048	40219	40250	40284	40297
Recoiling parts (buffer spring not included), lb			0.86		
Trigger pull (average of five trials), lb	8.1	6.5	6.8	8.4	8.1
Fully loaded magazine (20-rounds), lb			0.68		

1.8 CONCLUSIONS

It is concluded that:

a. With the exception of one rifle which failed to meet performance specifications because of excessive failures to fire semiautomatically, all of the rifles tested met those performance requirements outlined in SAPD-253 (ref par. 1.7, i).

b. In the automatic accuracy and adverse conditions testing (no performance criteria delineated in SAPD-253) no significant design or operational deficiencies were encountered (ref par. 1.7, c, d, e, f, k, l, and m).

1.9 RECOMMENDATIONS

It is recommended that:

a. Consideration be given to excluding 5-round-burst automatic-accuracy firing from the standing position from future comparison test plans (ref par. 1.7 d).

b. Adequate cleaning equipment as defined in paragraph 1.7 j accompany the rifles.

c. Consideration be given to incorporating into SAPD-253 lubrication requirements for the rifles, as described in paragraph 1.7 i.

SECTION 2. DETAILS OF TEST

2.1 INTRODUCTION

The rifles were tested in accordance with the test directive except when it was more feasible to reduce or enlarge the number of rifles subjected to particular phases of testing. Rifles were subjected to the extreme cold and extreme heat phases approximately 18 hours instead of 12 hours prior to firing because of normal work-hour schedules.

2.2 EXAMINATION

There was no damage to the packing and crating or to the test equipment. The clarity of marking was good. The box containing each rifle also contained a web sling and one magazine. The supply of magazines and spare parts was sufficient. The bolts assembled in each rifle did not have an escape hole near the base of the ejector to permit water accumulating in the ejector housing to run out. The two spare-parts bolts had drain holes drilled for that purpose; however, the bolt rings were not assembled.

The rifles were disassembled, inspected, weighed, and measured. Bore measurements were recorded by Physical Test Laboratory (Appendix III). Weights and measurements of the complete rifle and accessories are recorded in Table I (paragraph 1.7).

2.3 MACHINE-REST ACCURACY

2.3.1 Objective

To determine if rifles conform to accuracy acceptance testing specifications.

2.3.2 Method

Three 10-shot groups were fired from each of five rifles at a range of 91.4 meters. Firing was conducted in an enclosed range using a universal accuracy cradle (heavy model) mounted on a V-block assembled in a Frankford Arsenal machine rest.

2.3.3 Results

Results are given in Table II.

Table II. Machine Rest Accuracy

Figures are averages for three 10-shot groups.

Rifle No.	MR	MVD	MHD	EVD	EHD	ES
40048	1.32	0.69	0.93	2.6	4.2	4.3
40219	0.98	.74	.50	2.7	2.1	3.0
40250	1.11	.83	.53	3.1	2.8	3.3
40284	0.86	.51	.58	2.2	2.3	2.6
40297	1.00	.68	.63	2.7	2.4	3.2

2.3.4 Analysis

The average extreme spread of the three 10-shot groups for the rifles ranged from 2.6 to 3.6 inches; 4.8 inches is specified as acceptable.

2.4 BENCHREST ACCURACY

2.4.1 Objective

To determine the accuracy of the test items at various ranges.

2.4.2 Method

Three groups of ten rounds each were fired from a benchrest by three riflemen with each of three rifles at a range of 100, 300, and 500 meters. The standard A target with a 12-inch bull's-eye was used as an aiming point at 100 and 300 meters. The standard B target, with a 20-inch bull's-eye, was used as an aiming point at 500 meters.

2.4.3 Results

Results are given in Table III.

Table III. Benchrest Accuracy

Figures are averages for nine 10-shot groups at each of three ranges.

Rifle No.	MR	MVD	MID	EVD	EHD	ES
Range: 100 meters.						
40048	1.03	0.62	0.63	2.8	2.7	3.4
40219	1.23	0.85	0.67	3.6	3.0	4.0
40250	0.97	0.72	0.50	3.1	2.1	3.4
Range: 300 meters.						
40048	2.99	2.12	1.72	8.1	6.6	9.4
40219	3.97	2.82	2.21	11.6	8.1	13.0
40250	3.34	2.08	2.19	8.7	7.7	10.1
Range: 500 meters.						
40048	5.95	4.05	3.50	18.0	14.9	20.4
40219	6.32	4.15	3.82	16.2	16.2	19.1
40250	5.66	3.86	3.27	17.2	13.5	19.3

2.4.4 Analysis

The extreme spread of individual targets for the three rifles at 100 meters is slightly smaller when compared to individual targets fired from the machine rest.

2.5 AUTOMATIC ACCURACY (3-ROUND BURST, 25 METERS, STANDING)

2.5.1 Objective

To determine the automatic-accuracy (of the rifle) when firing 3-round bursts from the standing position at a range of 25 meters.

2.5.2 Method

Ten 3-round bursts were fired from the standing position, at a range of 25 meters, by three riflemen with each of three rifles.

The type of target used as an aiming point for all automatic accuracy was the National Rifle Association 50-meter small-bore rifle target with a 3.15-inch bull's-eye. The 30-shot mean radius of each target is measured from the center of the bull's-eye, used as an aiming point. The 20-shot mean radius of each target is based on shots fired automatically, the second and third rounds in each 3-round burst, and are measured from the center of impact of the first rounds.

The first round of the burst should not be considered as being fired automatically since it is controlled by aiming, trigger squeeze, and deliberate firing.

2.5.3 Results

Results are given in Table IV.

Table IV. Automatic Accuracy (3-Round Burst, 25 Meters, Standing)

Figures, given in inches, are averages for thirty 3-round bursts fired from each rifle.

	MR				ES	
Rifle No.	30 Shots	20 Shots	EV	EH	All Shots	Aimed Shots
40048	48.4	72.0	110.2	45.3	117.8	2.8
40219	48.1	72.7	110.9	46.3	117.8	2.2
40250	47.5	71.4	110.8	38.4	115.9	2.2
Average	48.0	72.0	110.6	43.3	117.2	2.4

2.5.4 Analysis

Comparison of data with those from prototype rifles fired at APG is not applicable since the conditions under which firing was conducted were not the same.

2.6 AUTOMATIC ACCURACY (5-ROUND BURST, 25 METERS, STANDING)

2.6.1 Objective

To determine the automatic accuracy of the rifle when firing 5-round bursts from the standing position at a range of 25 meters.

2.6.2 Method

Ten 5-round bursts were fired from the standing position at a range of 25 meters by three riflemen with each of three rifles. The normal procedure when firing from the standing position is to have the aiming point shoulder-high and the line of bore approximately level. The shooter assumed the standing position in a 40-inch-deep hole to permit lowering of the aiming point 40 inches in an effort to contain all shot impacts on the 20-foot-high by 12-foot-wide target (Figure 1).

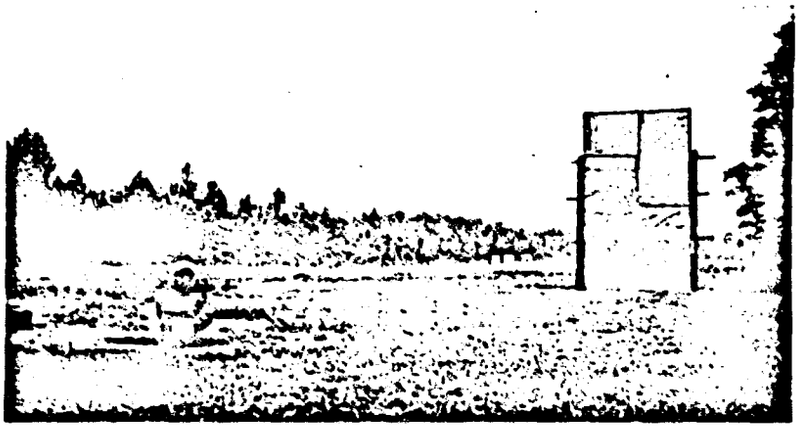


Figure 1: Setup for Automatic Accuracy Test, 25 Meters, 5-Round Burst, Standing.

The 50-shot mean radius of each target is measured from the center of the bull's-eye used as an aiming point. The 40-shot mean radius of each target is based on the shots fired automatically or the second, third, fourth, and fifth rounds in each 5-round burst, and are measured from the center of impact of the first rounds.

2.6.3 Results

Results are given in Table V.

Table V. Automatic Accuracy (5-Round Burst, 25 Meters, Standing)

Figures are given in inches.

	MR				ES	
Rifle No.	50 Shots	40 Shots	EV	EH	All Shots	Aimed Shots
Rifleman: R. Connolly.						
40048	Nine shots missed the target[a].					2.4
40219	Ten shots missed the target[a].					2.7
40250	Ten shots missed the target[a].					2.0
Rifleman: L. Staley.						
40048	97.7	123.2	214.6	76.2	222.5	2.9
40219	100.0	126.0	209.3	88.5	217.5	3.1
40250	One shot missed the target.					2.5
Rifleman: G. Hendricks.						
40048	Three shots missed the target[a].					2.6
40219	Three shots missed the target[a].					1.8
40250	Five shots missed the target[a].					2.2

[a]Target, 20 feet high and 12 feet wide used for all firings.

2.6.4 Analysis

Analysis of all shots fired cannot be made since 9% of the shots missed the 20-foot-high by 12-foot-wide target.

2.7 AUTOMATIC ACCURACY (3-ROUND BURST, 50 METERS, PRONE)

2.7.1 Objective

To determine the automatic accuracy of the rifle when firing 3-round bursts from the prone position at a range of 50 meters.

2.7.2 Method

Ten 3-round bursts were fired from the prone position at a range of 50 meters by three riflemen with each of three rifles. Firing was conducted without sling or other means of artificial support.

Data were compiled as described in paragraph 2.5.2.

2.7.3 Results

Results are given in Table VI.

Table VI. Automatic Accuracy (3-Round Burst, 50 Meters, Prone)

Figures, given in inches, are for thirty 3-round bursts fired from each rifle.

	MR				ES	
Rifle No.	30 Shots	20 Shots	EV	EH	All Shots	Aimed Shots
40048	42.1	62.8	89.0	30.8	90.6	2.0
40219	40.5	60.0	83.9	26.7	85.1	2.4
40250	42.0	62.6	92.2	29.1	93.0	2.5
Average	41.5	61.8	88.4	28.9	89.6	2.3

2.7.4 Analysis

Comparison of data with those from prototype rifles fired at APG is not applicable since the conditions under which firing was conducted were not the same.

2.8 AUTOMATIC ACCURACY (5-ROUND BURST, 50 METERS, PRONE)

2.8.1 Objective

To determine the automatic accuracy of the rifle when firing 5-round bursts from the prone position at a range of 50 meters.

2.8.2 Method

Ten 5-round bursts were fired from the prone position at a range of 50 meters by three riflemen with each of three rifles. Firing was conducted without sling or other means of artificial support. Data were compiled as described in paragraph 2.6.2.

2.8.3 Results

Results are given in Table VII.

Table VII. Automatic Accuracy (5-Round Burst, 50 Meters, Prone)

Figures, given in inches, are for thirty 5-round bursts fired from each rifle.

	MR				ES	
Rifle No.	50 Shots	40 Shots	EV	EH	All Shots	Aimed Shots
40048	55.2	69.4	104.0	47.1	106.2	3.0
40219	52.7	65.9	94.4	47.6	96.3	2.5
40250	60.6	75.5	103.0	44.0	103.3	2.3
Average	56.2	70.3	100.5	46.2	101.9	2.6

2.8.4 Analysis

Comparison of data with those from prototype rifles fired at APG is not applicable since the conditions under which firing was conducted were not the same.

2.9 AUTOMATIC ACCURACY (3- AND 5-ROUND BURSTS, 25 METERS, FIRED FROM THE HIP)

2.9.1 Objective

To determine the automatic accuracy of the rifle when firing 3- and 5-round bursts from the hip.

2.9.2 Method

Ten 3-round bursts were fired from the hip at a range of 25 meters at an E target by each of three riflemen with one rifle. The procedure was repeated firing 5-round bursts.

2.9.3 Results

Results are given in Table VIII.

Table VIII. Automatic Accuracy (Fired from the Hip)

3-Round Bursts			5-Round Bursts		
No. Rds Fired	No. Bursts	Hits on E Target	No. Rds Fired	No. Bursts	Hits on E Target
90	30	19	150	30	32

2.9.4 Analysis

Not applicable.

2.10 COMBAT ACCURACY

2.10.1 Objective

To determine the accuracy that can be obtained with the rifle under various conditions similar to those encountered in combat.

2.10.2 Method

Three riflemen each fired the following course at 100 yards with one rifle:

a. With sights properly adjusted and with a fouled bore, one 10-round target was fired from a benchrest.

b. The rifle was disassembled (field stripped), cleaned, lubricated, and reassembled.

c. Starting with a cold and oiled bore, one 10-round target was fired from a benchrest.

d. One 10-round target was fired from the prone position using a sling.

e. One hundred rounds were fired as rapidly as possible.

f. Immediately after firing the 100 rounds, one 10-round target was fired from a benchrest.

g. Another 10-round target was fired immediately from the prone position using a sling.

2.10.3 Results

Results are given in Table IX.

Table IX. Combat Accuracy

The averages for the three riflemen are given in inches.

Mean Radius from CI of First (Normal) Target	MR	Extreme Spread	Extreme Shot to CI of First (Normal) Target
3.00	1.07	4.0	4.4

2.10.4 Analysis

Not applicable.

2.11 RATE-OF-AIMED-FIRE TEST

2.11.1 Objective

To determine the number of hits on an E target in 1 minute, when using semiautomatic and automatic fire.

2.11.2 Method

With the same rifle, three riflemen each fired as many aimed shots as possible in a 1-minute period using semiautomatic fire, and in a 1-minute period using automatic fire. The course was fired three times per individual and the hits were recorded on the E target at 100 yards. Shooters used a sling and shooting glove and fired from the prone position. Automatic fire was fired in approximately 3-round bursts.

2.11.3 Results

Results are given in Table X.

Table X. Rate of Aimed Fire

Figures given are the average number of shots fired and the average number of hits obtained by three shooters.

No. Shots Fired	No. Bursts	No. Hits Obtained
	Semiautomatic Fire	
79.3	-	77.8
	Automatic Fire	
93.9	35.7	38.2

2.11.4 Analysis

Automatic fire, compared to semiautomatic fire, resulted in a reduction of the average number of hits obtained by 39.6 per minute although there was a 14.6 increase in the average number of shots fired per minute.

2.12 EXTREME COLD TEST

2.12.1 Objective

To determine the ability of the rifles to function under the adverse condition.

2.12.2 Method

The test plan (Appendix I, par. D 2 a) requested that the cold test be conducted as outlined in TECP 700-700; however, it was necessary to deviate in the following respects:

a. Operations during normal duty hours necessitated conditioning of the rifles and ammunition in the cold room for approximately 18 hours prior to firing, instead of 12 hours.

b. Due to nonavailability of -65°F cold room facilities during the week of 1 through 5 June 1964 and due to need for obtaining early indication of performance of the test items under extreme cold conditions,

Mr. Shanahan, representative of USAWECOM, requested that an available -35°F cold test chamber be used for preliminary testing. Mr. Shanahan requested that the test should be repeated at -65°F when facilities were available.

c. At the request of Mr. Shanahan, the original bolts from rifles 040284 and 040297 were replaced with bolts sent as spare parts, having a hole to permit drainage from the ejector housing. The bolts were magnafluxed before the cold test and again after all tests were completed.

d. Two rifles were disassembled, cleaned, and lubricated with MIL-L-14107 oil and placed with loaded magazines in a cold room maintained at -35°F for approximately 18 hours prior to firing. After this period, 40 rounds were fired semiautomatically, 20 rounds were fired automatically in short bursts, and 20 rounds in one burst. The firing schedule was repeated after an additional 2-hour conditioning period. The test was repeated using different rifles at a later date, except that the cold room was maintained at -65°F.

2.12.3 Results

Results are given in Table XI.

Table XI. Cold Test

Rifle No.	Rds Fired	Function	Remarks
Conditioning Temperature: -35°F.			
040284	160	7-FFR	After firing 80 rounds satisfactorily and after the 2-hour period to permit the rifle to return to temperature had expired, seven attempts were made to fire the first round before the bolt would close completely.
040297	140	20-FX	After firing 60 rounds, the bolt assembly was disassembled and inspected. The extractor was bent (Figure 2). A new extractor and extractor spring were installed and

Table XI (Cont'd)

Rifle No.	Rds Fired	Function	Remarks
			after an additional 2-hour period the remaining 80 rounds were fired without any malfunctions.
Conditioning Temperature: -65°F.			
040250	160	Satis	
040219	160	Satis	

Legend: FFR = Failure to fire.
FX = Failure to extract.

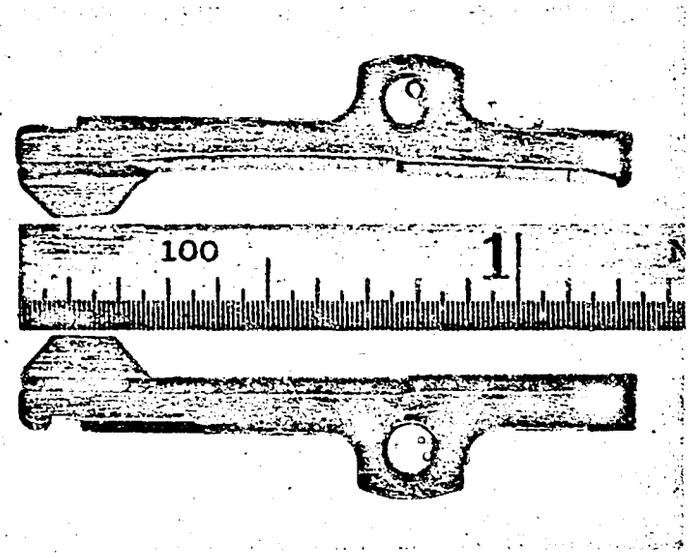


Figure 2: Bent Extractor (Top) beside Normal One for Comparison.

2.12.4 Analysis

Not applicable.

2.13 RELIABILITY TEST

2.13.1 Objective

To assure that the rifles conform to acceptance testing specifications of SAPD 253 as revised and in effect at the time of test.

2.13.2 Method

The sequence of firing on each of two rifles was as follows:

a. Record instrumental velocity for 20 rounds.

b. Fire rounds 21 through 2000 in sequence of 80 rounds semiautomatic and 20 rounds full automatic. Semiautomatic firing was conducted at a rate of 20 to 30 rounds per minute. The cyclic rate of fire was recorded on every tenth 20-round burst. The rifle was cooled after each 100 rounds.

c. Fire 40 rounds semiautomatic with the rifle held right side up.

d. Fire 40 rounds semiautomatic with the rifle held left side up.

e. Fire 40 rounds semiautomatic with the rifle held loosely in the hands not touching the shoulder.

f. Fire rounds 2121 through 5980 in sequence specified in step b.

g. Record instrumental velocity for 20 rounds.

Fire one 10-round target from a benchrest at 100 yards.

2.13.3 Results

Results are given in Table XII.

Table XII. Reliability Test Results

	Avg Instrumental Vel at 20 Feet, fps						
	Before Reliability Test	After Reliability Test	No. Rds Fired	No. Times Cleaned and Lubricated	Avg Cyclic Rate of Fire, rds/min	Malfunctions	Remarks
Rifle No.: 040297.							
Avg	3085	3015	5799	6	822	5-F2R	On five occasions with the selector set for semi-automatic, two rounds fired with each rearward movement of the trigger.
Max	3175	3082					
Min	3035	2950					
Ext Var	140	132					
Mean Var	18.8	28.4					
						1-FF	On one occasion the bolt lacked sufficient energy to strip the round from the magazine.
							In firing 5799 rounds, 94 stretched cases occurred.
Rifle No.: 040284.							
Avg	3091	3020	5787	3	807	16-FF	On six occasions the bolt catch engaged the bolt while firing.
Max	3185	3101					
Min	3040	2958					
Ext Var	145	143					
Mean Var	26.4	27.8					
							On five occasions the bolt lacked sufficient energy to strip the round from the magazine.
							On three occasions the nose of the bullet stubbed the receiver.

Table XII (Cont'd)

Avg Instrumental Vel at 20 Feet, fps						
Before Reliability Test	After Reliability Test	No. Rds Fired	No. Times Cleaned and Lubricated	Avg Cyclic Rate of Fire, rds/min	Malfunctions	Remarks
						On two occasions the bolt failed to close completely.
					2-FFR	On one occasion after firing 1624 rounds since cleaning or lubricating, the accumulation of carbon would not permit movement of the firing pin within the bolt. The rifle was cleaned and lubricated.
						On one occasion the bolt failed to close completely.
					1-FBR	On one occasion the bolt failed to remain at the rear after the last round.
						In firing 5787 rounds, 124 stretched cases occurred.

Legend: FBR = Failure of bolt to remain to rear after last round. FF = Failure to feed.
FZR = Fired 2 rounds on one rearward movement of trigger. FFR = Failure to fire.

Note: Cleaning and lubrication of rifle 040284 was deliberately curtailed to learn the effects on functioning of prolonged firings without maintenance. Fourteen FF's and 2 FFR's occurred when firing was continued beyond 1000 rounds (regular cleaning point) without cleaning the rifle. These malfunctions should not be charged against the weapon.

2.13.4 Analysis

Sixteen of 19 malfunctions on rifle 040284 occurred when firing was continued beyond the 1000-round cleaning point. These malfunctions were not charged against the rifle (ref Table XII, par. 2.13).

The average loss of velocity as a result of the reliability test was 70 fps. Rifle 040297 gave an excessive number of failures to fire semiautomatically (single rounds).

2.14 UNLUBRICATED TEST

2.14.1 Objective

To determine the ability of the unlubricated rifle to function.

2.14.2 Method

The rifle was disassembled and cleaned with trichloroethane, quick-drying solvent. All parts were left in a dry, unlubricated condition and reassembled. One hundred rounds were fired in five 20-round bursts.

2.14.3 Results

The average cyclic rate of fire of five 20-round bursts was 722 rounds per minute. No malfunctions occurred.

2.14.4 Analysis

Satisfactory function was obtained.

2.15 INTERCHANGE TEST

2.15.1 Objective

To determine if certain repair parts can be interchanged without adverse effect.

2.15.2 Method

Two rifles were disassembled, cleaned, and lubricated. Spare parts furnished by the contractor were interchanged with like parts. The following parts were interchanged.

a. Bolt carrier.

b. Firing pin.

c. Ejector spring.

d. Ejector.

e. Extractor spring.

f. Extractor.

g. Hammer assembly.

h. Trigger spring.

i. Retaining pin.

j. Automatic sear assembly.

The sequence of firing was five rounds semiautomatic, 15 rounds automatic, in bursts of approximately five rounds each, and 20 rounds automatic in one burst.

2.15.3 Results

The cyclic rate of fire of the 20-round burst on rifles No. 040250 and 040219 were 763 and 764 rounds per minute, respectively. No malfunctions occurred.

2.15.4 Analysis

Satisfactory function was obtained.

2.16 MUD TEST

2.16.1 Objective

To determine the ability of the rifle to function under adverse conditions of mud.

14

2.16.2 Method

The rifle was cleaned, lubricated, and the muzzle was taped shut. The rifle was fully loaded, dust cover closed, and the selector placed in the SAFE position. The rifle was immersed completely in the mud for a period of 15 seconds.

The mud mixture is made in the proportion of 10 pounds of red clay and 2 pounds of clean river sand with 8 quarts of water. The shooter removed the tape from the muzzle and attempted to clean the rifle by wiping with the bare hands and by shaking mud from the congested areas. The selector was placed in the SEMI position and 20 rounds were fired semiautomatically.

2.16.3 Results

No malfunctions occurred.

2.16.4 Analysis

Satisfactory function was obtained.

2.17 RAIN TEST

2.17.1 Objective

To determine the ability of the rifle to function under adverse conditions of rain.

2.17.2 Method

The rifle was cleaned and lubricated with lubriplate and subjected to spray which was directed over the entire rifle at an average rate of rainfall of 25.2 inches per hour. The water temperature was 74.8°F and the air temperature during the test dropped from 92.2 to 88.1°F. The following procedure was used.

a. The rifle in a horizontal position was exposed to the spray for 5 minutes with the bolt retracted and for 5 minutes with the bolt closed. The rifle was loaded when the bolt was closed. After this time, the rifle was fired 100 rounds semiautomatically.

b. The procedure in a was repeated except that 100 rounds were fired automatically in 20-round bursts.

c. The procedure in a was repeated except that the rifle was exposed to the spray with muzzle up. The rifle was fired 100 rounds semiautomatically from a horizontal position. Before firing, the muzzle of the rifle was depressed and the bolt was retracted slightly to permit water accumulating in the bore to run out.

d. The procedure in c was repeated except that the rifle was fired automatically in 20-round bursts.

e. The procedure in c was repeated except that the rifle was exposed to the spray with muzzle down; therefore, it was not necessary to depress the muzzle or retract the bolt before firing.

f. The procedure in e was repeated except that the rifle was fired automatically in 20-round bursts. Firing was conducted with the rifle mounted in a spring-loaded rest.

2.17.3 Results

The first 500 rounds were fired without malfunctions. In firing the last 100 rounds, a primer punch-out occurred and pieces of primer metal caused 13 failures to fire. The bolt group was disassembled and several pieces of brass from the primer punch-out were found lodged on the firing pin in the bolt and did not permit the firing pin to move the required length of travel to strike the primer.

2.17.4 Analysis

No malfunctions chargeable to weapons were encountered.

2.18 DUST TEST

2.18.1 Objective

To determine the ability of the rifle to function under adverse conditions of dust.

2.18.2 Method

The rifle was cleaned and was lightly lubricated. The rifle was fully loaded, and the selector placed in the SAFE position. The rifle, with its dust cover closed, was then placed in the dust box and exposed to the dust for 1 minute top side up and for 1 minute upside down. The dust mixture was made by mixing 9 pounds of grade O Albany sand with 1 pound of clean silica core sand which passed 100% through a 30-mesh sieve, and 80% through a 50-mesh sieve. The dust was poured at a rate of 5 pounds per minute through the pour hole while the blower was turned at a handle speed of 60 rpm. The rifle was removed from the dust box, the selector placed in SEMI position and 20 rounds were fired semiautomatically.

2.18.3 Results

No malfunctions occurred.

2.18.4 Analysis

Satisfactory function was obtained.

2.19 HEAT AND HUMIDITY TEST

2.19.1 Objective

To determine the ability of the rifle to function under adverse conditions of heat and humidity.

2.19.2 Method

The test plan specified that the test be conducted in the same manner outlined for the extreme cold test; however, owing to unavailability of a climatic chamber, the rifle was cleaned, lubricated, and placed with loaded magazines in a cabinet controlled at +125°F and 90% relative humidity for a period of approximately 18 hours instead of 12. After this period, 40 rounds were fired semiautomatically, 20 rounds were fired automatically in short bursts, and 20 rounds in one burst. The firing schedule was repeated after an additional 2-hour conditioning period.

2.19.3 Results

Before firing, it was necessary to strike the butt of the rifle on hard ground several times, while applying rearward pressure on the charging handle to retract the bolt. The bolt assembly was disassembled and inspected. The cam pin was rusted and it was necessary to rotate the bolt in the bolt carrier many times by hand to reduce the friction between the cam pin and the bolt carrier before the action could be opened by using the charging handle. After the rifle was made operational, 160 rounds were fired satisfactorily.

2.19.4 Analysis

The difficulty encountered before the rifle could be fired can be attributed to rusting of the cam pin during exposure of the rifle to high humidity and temperature.

2.20 OBSERVERS

Name	Arrival Date	Departure Date	Representing
Mr. Shanahan	26 May 1964 8 July 1964	4 June 1964 17 July 1964	US Army Weapons Command
Mr. Rzeszutek	26 May 1964 22 June 1964	4 June 1964 26 June 1964	Springfield Armory
Mr. Calabrese	8 June 1964	19 June 1964	Springfield Armory

SECTION 3. APPENDICES

APPENDIX I - TEST DIRECTIVE

COPY/jab

AMSTE-BC (11 May 64) 1st Ind
SUBJECT: Comparison Test of Rifle, 5.56mm, M16

Headquarters, U. S. Army Test and Evaluation Command, Aberdeen Proving Ground, Maryland 21005 15 MAY 1964

TO: Commanding Officer, Aberdeen Proving Ground, ATTN: STEAP-DS, Aberdeen Proving Ground, Maryland 21005

1. For necessary action.

2. This test is assigned USATECOM Project No 8-4-0230-01F, and will be accorded priority as required to provide results at the earliest practicable date. However, the priority accorded this project will not be such as to cause interference or delay in the SPIW program.

3. With respect to paragraphs 7 and 8, basic communication, it is requested that this headquarters be furnished information copies of reports submitted to USA Weapons Command and starting date for test, when established.

FOR THE COMMANDER:

/s/ Oliver H. Aspinwall, Jr.
/t/ OLIVER H. ASPINWALL, JR.
Capt, AGC
Asst Admin Officer

2 Incls
1. nc (w/d 1 cy)
Added 1 incl
2. Teams Form w/d

Copies furnished:
CG USAWECOM, ATTN: AMSWE-QA
CO Springfield Armory, ATTN: SWESP-P, Hassett
CDC LnO (USATECOM)
USMC LnO (USATECOM)

11

COPY/jab

AIR MAIL
HEADQUARTERS
U. S. ARMY WEAPONS COMMAND
ROCK ISLAND ARSENAL
ROCK ISLAND, ILLINOIS
61202

IN REPLY REFER TO
AMSWE-QA 11 May 1964

SUBJECT: Comparison Test of Rifle, 5.56mm, M16

TO: Commanding General
U. S. Army Test & Evaluation Command
ATTN: AMSTE-BC
Aberdeen Proving Ground, Maryland

1. It is requested that Development & Proof Services, Aberdeen Proving Ground, conduct a Comparison Test of Rifle, 5.56mm, M16, in accordance with inclosed plan of test at the earliest possible time.

2. With respect to conduct of tests outlined, it is desired that two rifles, instead of one, be subjected to the Cold Test (Reference Test Nr. 4 - Adverse Conditions); and that the Cold Test be run on the two rifles selected after completion of Initial Inspection Test and Targeting and Accuracy Test at 91.4 meters from Machine Rest and before use in other tests.

3. Five (5) rifles, with supporting repair parts, have been forwarded from Colt's Patent Fire Arms Mfg. Co., Contract DA-11-199-AMC-508(Y), to D&PS, APG, Attn: STEAP-DS-TI. Funds have been provided to support this test under PRON 45-4-76232-01-45-K2.

4. Ammunition from Lot RA5027 has been provided to D&PS. Frankford Arsenal reports that this lot 5.56mm ammunition has a mean radius of 1.09 inches at 200 yards.

5. Since the Army Technical Manual for the M16 Rifle has not yet been published, a copy of the USAF Technical Manual, TO 11W3-5-S-1, on the rifle is being furnished D&PS under separate cover for interim use.

6. Technical coordination will be effected directly with D&PS, APG.

7. It is further requested that reports of equipment failure be submitted to this command, Attn: AMSWE-QA, in accordance with USATECOM Regulation Nr. 705-4, with distribution limited to that stated in paragraph 5c thereof. Ten (10) copies of the final reports of test are required by this Headquarters. Disposition instructions for test materiel will be provided upon completion of test.

AIR MAIL

COPY/jab

AMSWE-QA 11 May 1964
SUBJECT: Comparison Test of Rifle, 5.56mm, M16

8. As representative of this Command will observe tests, information as to starting date is requested as soon as established. In this connection, early commencement of requested test will be appreciated.

FOR THE COMMANDER:

/s/ E. V. Francis
/t/ for B. C. GERKE
Chief, Quality Assurance Office

Incl (dupe)
as

Copy furnished:
CO, Aberdeen Proving Ground
ATTN: STEAP-DS-TI, Doilney

CO, Springfield Armory
ATTN: SWESP-P, Hassett

16

COPY/jab

HEADQUARTERS
U. S. ARMY WEAPONS COMMAND
Comparison Test Plan, Rifle 5.56mm, M16

I. GENERAL

A. Objective. The objective of this Comparison Test is to provide a basis for an impartial and objective evaluation of the Rifle, 5.56mm, M16, and to assure that:

1. It is at a level of quality which, by comparison, is equal to or better than the prototype accepted by the user.

2. It completely conforms to all technical requirements of SAPD 253 as revised and in effect at the time of test.

B. Description. The Rifle, 5.56mm, M16 (Colt's AR-15) is a light-weight, air cooled, gas operated, magazine fed, shoulder weapon capable of semi-automatic or full automatic fire at a cyclic rate of approximately 750 rounds per minute.

C. References.

1. TECP 700-700 (Ordnace Proof Manual) Volume I - Arms & Ammunition Testing.

2. Springfield Armory Purchase Description SAPD-253-Acceptance Testing Specification For Rifle, AR-15 (Rifle, 5.56mm, M16), as amended.

3. TM 9-1005-249-14 (Draft) Rifle, 5.56mm, M16.

4. Specification MIL-W-13855 - General Specification for Small Arms Weapons.

D. Reports.

1. When a deficiency is revealed which will adversely affect the ability of the rifle to meet the overall test objective, Headquarters, U. S. Army Weapons Command, ATTN: AMSWE-QA and AMCPM-AR-15 will be notified by electrical means. This notification will be followed immediately by a serially numbered written record describing the deficiency and circumstances in detail.

2. At the conclusion of tests, a formal written report will be forwarded to Headquarters, U. S. Army Weapons Command, ATTN: AMSWE-QA, in 10 copies. No further distribution authorized. Request preparation of final report in accordance with D&PS report format.

E. General Test Instructions.

1. Five M16 Rifles will be provided for tests. A complete record of test findings, by rifle Serial No., substantiated by physical data, photographs and written descriptions, as applicable, will be maintained.

2. Data requested in the test plan is a minimum requirement. However, it is both anticipated and desired that additional pertinent test data be provided as deemed appropriate by the test agency.

3. Determine cause-and-effect relationships for malfunctions and failures, when possible.

4. Procedures described in TECP 700-700, Volume I (Ordnance Proof Manual) will be used to augment methods described herein. The final test report will make reference to specific portions of that regulation when used.

5. Procedures outlined in TM-9-1005-249-14(Draft) will be followed for disassembly, assembly, inspections, cleaning, lubrication and adjustment of weapons. Any recommended changes to the manual shall be included in the final report.

6. Lubricate rifles as prescribed in TM 9-1005-249-14(Draft), using the following lubricants for the stated conditions:

a. MIL-L-644B-General Purpose Lub. Oil (Normal Conditions).

b. MIL-L-14107-Weapons Lub. Oil, low temp. Type (Extreme Cold Conditions).

c. Rifle Grease-Lubriplate (Use as Required).

7. Unless otherwise specified, Ball ammunition shall be used throughout the Comparison Test.

8. Throughout all tests identify and record magazine, ammunition and weapons malfunctions separately, when these can be determined.

9. Throughout all tests observe and record the effectiveness and suitability of modified Bolt Charger and Bolt Assist Device (if provided).

II. DESCRIPTION OF TESTS

A. Test Nr. 1 - Initial Inspection

1. Objective: To determine completeness and serviceability of test items.

2. Method:

a. Examine the material as received for:

(1) Adequacy and clarity of marking.

(2) Damage to packing and crating.

(3) Damage to the test items.

(4) General condition - Visually examine all test items to determine their general quality, cleanliness, and completeness. Also examine all markings on the test items for legibility.

b. Manually check the functioning of all operating parts.

c. Examine and inventory all ancillary and accessory equipment, spare parts, tools, and special test equipment.

d. Weigh and measure test items and record tabulated data.

e. Function fire all rifles as outlined in Para 10, SAPD 253. Record results.

B. Test Nr. 2 - Targeting and Accuracy Test.

1. Objective: To determine the targeting and accuracy capabilities of the test items at various ranges (25-500 meters).

2. Method:

a. Semi-Automatic fire:

(1) From Machine Rest.

(a) Fire three (3) groups of ten (10) rounds each from all rifles at a range of 91.4 meters.

(b) The sight setting shall be checked for hold and adjusted as necessary after each shot.

(c) Record results and compute extreme spread (ES) and center of impact (CI) for each shot group and average for each rifle.

(2) From Bench Rest (by three expert riflemen with each of three (3) rifles).

(a) Fire three (3) groups of ten (10) rounds each at ranges of 100, 300 and 500 meters.

(b) Record results and compute center of impact (CI) and extreme spread (ES) and mean radius (MR) for each shot group and average for each rifle.

b. Automatic fire (by three expert riflemen with each of three (3) rifles).

(1) Fire ten (10) three (3) round bursts at ranges of 25 meters from the standing position with rifle at the shoulder.

(2) Repeat (1) above in five (5) round bursts.

(3) Repeat (1) and (2) above at a range of 50 meters from prone position.

(4) Record results and compute CI, ES and MR for each shot group and average for each rifle.

(5) Repeat (1) and (2) above fired from the hip at ranges of 25 at an "E" type silhouette target. Record number of hits for each exercise and average for each rifle.

Conduct Standard Combat Accuracy and Aimed Rate-of-Fire Tests, (REF. TECP 700-700, Volume I, App II, Standard Light Automatic Rifle Test, Test Nr. IV, Para 3 and 4) with one rifle. Record results.

C. Test Nr. 3 - Unlubricated

1. Objective: To determine ability of test item to function in unlubricated condition.

2. Method: Conduct test outlined in TECP 700-700, Vol I, OPM 20-10, Unlubricated Test, with one rifle. Record results.

D. Test Nr. 4 - Adverse Conditions

1. Objective: To determine ability of test items to function under various adverse conditions.

2. Method:

a. Conduct Dust, Mud, Cold and Rain Tests outlined in TECP 700-700 with one rifle. The "muzzle up" portion of Rain Test will be conducted last.

b. Conduct Extreme Heat and Humidity Test (125 degrees Fahrenheit and 90% relative humidity) in manner outlined for Extreme Cold Test with one rifle.

c. Record results.

E. Test Nr. 5 - Reliability

1. Objective: To determine the reliability of the test item through 6,000 rounds of firing.

2. Method:

a. One test item that has completed accuracy firing will be subjected to the Reliability Test specified in Para 12, SAPD-253.

b. Rounds fired in preceding tests will be counted as part of the 6,000 round total for reliability firing.

c. Record results.

20

COPY/jab

F. Test Nr. 6 - Repair Parts - Interchange Test

(Perform upon completion of all firing tests, except firing test indicated as part of interchange test).

1. Objective: To determine if selected repair parts can be used without adverse effects.

2. Method:

a. Using three (3) clean and lubricated rifles, the repair parts furnished will be interchanged with the like parts of the selected rifles.

b. After interchanging parts, each rifle will be function fired in accordance with Para 10, SAPD 253.

c. Record results.

APPENDIX II - FUNCTION REPORTS

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
Rifle, 5.56-mm, M16, No. 040048. Cartridge, ball, caliber .223, lot RA 5027.					
Date: 1 June 1964.					
				Function Test	
	40	40			
Date: 2 June 1964.					
				Machine Rest Accuracy	
	3	43	SS		Sighting shots.
	30	73	SS		
Date: 17 June 1964.					
				Benchrest Accuracy (100 meters)	
	9	82	S		Sighting shots.
	30	112	S		
	30	142	S		
	30	172	S		
Date: 18 to 23 June 1964.					
				Benchrest Accuracy (300 meters)	
	9	181	S		Sighting shots.
	30	211	S		
	30	241	S		
					One small leak in primer joint.
	30	271	S		
Date: 23 and 24 June 1964.					
				Benchrest Accuracy (500 meters)	
	9	280	S		Sighting shots.
	30	310	S		
	30	340	S		
	30	370	S		

21

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
Dates: 19 June to 10 July 1964.					
Automatic Accuracy (25 Meters, 3-Round Bursts, Standing)					
	15	385	S		Sighting shots.
	30	415	A		
	30	445	A		
	30	475	A		
Automatic Accuracy (25 Meters, 5-Round Bursts, Standing)					
The rifle was cleaned and lubricated.					
	50	525	A		
	50	575	A		
	50	625	A		
(50-Meters, 3-Round Bursts, Prone Without Sling)					
	15	640	S		Sighting shots.
	30	670	A		
	30	700	A		
	30	730	A		
(50-Meters, 5-Round Bursts, Prone Without Sling)					
	50	780	A		
	50	830	A		
	50	880	A		
Dates: 13 and 14 July 1964.					
Combat Accuracy Test					
	7	887	S		Sighting shots.
	50	937	S		
	100	1037	A		Fired in 28 seconds.
	50	1087	S		
	100	1187	A		Fired in 28 seconds.
	50	1237	S		
	100	1337	A		Fired in 31 seconds.
Date: 16 July 1964.					
The rifle was disassembled, cleaned, and assembled in an unlubricated condition.					

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
		Unlubricated Test			
	100	1437	A		Cyclic rates of fire were 653, 696, 737, 756, and 767 rds/ min.

Date: 20 July 1964.

The rifle was disassembled, cleaned, and lightly lubrica d.

		Dust Test			
	20	1457	S		

Rifle, 5.56-mm, M16, No. 040219.
Cartridge, ball, caliber .223, lot RA 5027.

Date: . June 1964.

		Function Test			
	40	40	S and A		

Date: 2 June 1964.

		Machine Rest Accuracy			
	3	43	SS		Sighting shots.
	30	73	SS		

Date: 16 June 1964.

The rifle was disassembled, cleaned, and lubricated with (MIL-L-14107).

		Extreme Cold Test (-65°F)			
0923 to C925	80	153			Fired from the shoulder.
1125 to 1126	80	233			One partial punch out in primer.

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
Dates: 17 to 24 June 1964.					
		Benchrest Accuracy (100 Meters)			
	5	238	S		Sighting shots.
	30	268	S		
	30	298	S		
	30	328	S		
Dates: 18 to 23 June 1964.					
		Benchrest Accuracy (300 Meters)			
	9	337	S		Sighting shots.
	30	367	S		
	30	397	S		
	30	427	S		
		Benchrest Accuracy (500 Meters)			
	10	437	S		Sighting shots.
	30	467	S		
	30	497	S		
	30	527	S		
Dates: 19 June to 10 July 1964.					
		Automatic Accuracy (25 Meters, 3-Round Bursts, Standing)			
	15	542	S		Sighting shots.
	30	572	A		
	30	602	A		
	30	632	A		
		Automatic Accuracy (25 Meters, 5-Round Bursts, Standing)			
		The rifle was cleaned, and lubricated.			
	50	682	A		
	50	732	A		
	50	782	A		

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
		Automatic Accuracy (50-Meters, 3-Round Bursts, Prone without Sling)			
	15	797	S		Sighting shots.
	30	827	A		
	30	857	A		
	30	887	A		
		Automatic Accuracy (50-Meters, 5-Round Bursts, Prone without Sling)			
	50	937	A		
	50	987	A		
	50	1037	A		One partial punch out in primer.

Dates: 13, 14, and 15 July 1964.

Rate-of-Aimed-Fire Test

The rifle was disassembled, cleaned, and lubricated.
Fired R. Connolly.

315	1352	S		Twelve stretched cases.
241	1593	A		Twenty stretched cases.

Fired by G. Hendricks.

239	1832	S	1-FF	The first round from the magazine stubbed on the receiver. Eight stretched cases.
307	2139	A		Seventeen stretched cases.

The rifle was disassembled, cleaned, and lubricated.

Fired by L. Staley.

232	2371	S	2-FF	On two occasions the gunner failed to latch the magazine. Eleven stretched cases.
297	2668	A		Twenty-four stretched cases.

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
Date: 16 July 1964.					
		Interchange Test			
	40	2708	S and A		Cyclic rate of fire 764 rds/min.

Rifle, 5.56-mm, M16, No. 040250.
Cartridge, ball, caliber .223, lot RA 5027.

Date: 1 June 1964.					
		Function Test			
	40	40	S and A		
Date: 2 June 1964.					
		Machine Rest Accuracy			
	3	43	SS		Sighting shots.
	30	73	SS		
Date: 16 June 1964.					

The rifle was disassembled, cleaned, and lubricated with (MIL-L-14107).

		Extreme Cold Test (-65°F)			
0926 to 0930	80	153			Fired from the shoulder.
1127 to 1129	80	233			
Dates: 17, 18, and 24 June 1964.					
		Benchrest Accuracy (100 Meters)			
	8	241	S		Sighting shots.
	30	271	S		The pistol grip was loose. It was tightened.
	30	301	S		
	30	331	S		

Time	No. Rds Fired	Total No. of Rds Fired or Test	Type Fire	Function	Remarks
Dates: 18 and 23 June 1964.					
		Benchrest Accuracy (300 Meters)			
	7	338	S		Sighting shots.
	30	368	S		
	30	398	S		
	30	428	S		
Dates: 23 and 24 June 1964.					
		Benchrest Accuracy (500 Meters)			
	30	458	S		
	30	488	S		
	30	518	S		
Dates: 19 June to 10 July 1964.					
		Automatic Accuracy (25 Meters, 3-Round Bursts, Standing)			
	12	530	S		Sighting shots.
	30	560	A		
	30	590	A		
	30	620	A		
		Automatic Accuracy (25 Meters, 5-Round Bursts, Standing)			
		The rifle was cleaned and lubricated.			
	50	670	A		
	50	720	A		
	50	770	A		
		Automatic Accuracy (50 Meters, 3-Round Bursts, Prone without Sling)			
	15	785	S		Sighting shots.
	30	815	A		
	30	845	A		
	30	875	A		

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
		Automatic Accuracy (50 Meters, 5-Round Bursts, Prone without Sling)			
	50	925	A		
	50	975	A		
	50	1025	A		
Date: 14 July 1964.					
		Automatic Accuracy (Fired from the Hip)			
	30	1055	A		
	50	1105	A		
	30	1135	A		
	50	1185	A		
	30	1215	A		
	50	1265	A		
Date: 16 July 1964.					
		Interchange Test			
	40	1305	S and A		Cyclic rate of fire 765 rds/min.
Date: 22 July 1964.					
		Heat and Humidity Test			
	160	1465	S and A		Two stretched cases.

Rifle, 5.56-mm, M16, No. 040297.
Cartridge, ball, caliber .223, lot RA 5027.

Date: 1 June 1964.

	Function Test		
40	40	S and A	

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
Date: 2 June 1964.					
		Machine Rest Accuracy			
	3	43	SS		Sighting shots.
	30	73	SS		
Date: 3 June 1964.					
The rifle was disassembled, cleaned, and lubricated with (MIL-L-14107).					
		Extreme Cold Test (-35°F)			
Date: 4 June 1964.					
0945 to 0948	60	133	S and A	20-FX	The bolt assembly was disassembled and inspected. The extractor was bent. A new extractor and extractor spring were installed, and firing was continued after a 2-hour period.
1145	80	213	S and A		
The rifle was disassembled, cleaned, and inspected and lubricated.					
Date: 5 June 1964.					
		Reliability Test			
0849 to 0909	20	233	S		Fired from a bench-rest to record time of flight.
1025 to 1555	900	1133			Cyclic rate 831 rds/min.
Date: 8 June 1964.					
0903 to 1528	700	1833			Eighteen stretched cases. Cyclic rate 829 rds/min.

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
The rifle was disassembled, cleaned, and lubricated. The firing pin was difficult to remove due to heavy deposit of carbon on the firing pin and bolt.					
1447 to 1521	200	2033			Three stretched cases.
Date: 9 June 1964.					
0842 to 1309	820	2853			Three stretched cases. Cyclic rate 825 rds/min.
The rifle was disassembled, cleaned, and lubricated.					
1319 to 1600	500	3353			Three stretched cases. Cyclic rate 834 rds/min.
Date: 10 June 1964.					
0847 to 1036	500	3853			Eight stretched cases.
The rifle was disassembled, cleaned, and lubricated.					
1118 to 1523	600	4453			Fourteen stretched cases. Cyclic rate 816 rds/min.
Date: 11 June 1964.					
0922 to 1101	400	4853			Ten stretched cases.
The rifle was disassembled, cleaned, and lubricated.					
1143 to 1549	700	5553		5-F2R 1-FF	Twenty stretched cases. The bolt failed to strip the round from the magazine. Cyclic rate 804 rds/min.

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
Date: 12 June 1964.					
0919 to 1042	300	5853			Eleven stretched cases.
The rifle was disassembled, cleaned, and lubricated.					
1340 to 1403	117	5970			Four stretched cases. Cyclic rate 815 rds/min.
1440 to 1505	22	5992	S		Fired from a benchrest to record time of flight.
1520 to 1523	10	6002	S		Fired from a benchrest to check accuracy.
Date: 16 July 1964.					
The rifle was disassembled, cleaned, and lubricated with lubriplate.					
Date: 17 July 1964.					
Rain Test					
1410 to 1500	600	6602		13-FFR	A primer punch out occurred after firing 500 rounds. Pieces of the primer lodged on the firing pin in the bolt and did not permit the firing pin to move the required length of travel to strike the primer.

Rifle, 5.56-mm, M16, No. 040284.
Cartridge, ball, caliber .223, lot RA 5027.

Date: 1 June 1964.

Function Test

40	40	S and A	

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
Date: 2 June 1964.					
		Machine Rest Accuracy			
	3	43	SS		Sighting shots.
	30	73	SS		
Date: 3 June 1964.					
The rifle was disassembled, cleaned, and lubricated with MIL-L-14107.					
		Extreme Cold Test (-35°F)			
Date: 4 June 1964.					
0940 to 0944	80	153	S and A		Fired from the shoulder.
1140 to 1144	80	233	S and A	7-FFR	Seven attempts were made to fire the first round before the bolt would close completely after the 2-hour soaking period.
The rifle was disassembled, cleaned, and inspected and lubricated.					
Date: 5 June 1964					
		Reliability Test			
0845 to 0905	20	253	S		Fired from a benchrest to record time of flight.
1018 to 1554	900	1153			Three stretched cases. Cyclic rate 825 rds/min.
Date: 8 June 1964.					
0858 to 1515	920	2073		1-FF 1-FFR 1-FBR	After firing 1856 rounds the nose of a bullet stubbed

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
					on the magazine. The same round failed to fire. It was necessary to disassemble, clean, and lubricate the rifle. The firing pin was difficult to remove due to a heavy deposit of carbon on the bolt and firing pin. Thirty-two stretched cases. Cyclic rate 845 rds/min.
Date: 9 June 1964.					
0837 to 1549	1320	3393		3-FF	On two occasions the nose of the bullet stubbed on the magazine. On one occasion, after firing 1417 rounds since the rifle was cleaned and lubricated, the bolt stripped the first round from a magazine but failed to close the bolt completely. It was necessary to apply thumb pressure on the bolt to close it. Four stretched cases. Cyclic rate of fire was 825 and 767 rds/min.
Date: 10 June 1964.					
0832 to 1031	500	3893		6-FF	On 5 occasions the bolt failed to strip the round from the

27

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
					magazine. On one occasion it was necessary to apply pressure to the bolt to close it completely. Six stretched cases.
The rifle was disassembled, cleaned, and lubricated.					
1123 to 1517	600	4493			Nine stretched cases. Cyclic rate 798 rds/min.
Date: 11 June 1964.					
0917 to 1546	1100	5593		5-FF	On each occasion the bolt catch engaged the bolt before the last round of the magazine was fired.
				1-FFR	The bolt failed to close completely. Forty-two stretched cases. Cyclic rate 808 rds/min.
Date: 12 June 1964.					
0914 to 1032	260	5853		1-FF	The bolt catch engaged the bolt before the last round of the magazine was fired. Eleven stretched cases.
The rifle was disassembled, cleaned, and lubricated.					
1328 to 1400	117	5970			Eleven stretched cases. Cyclic rate 783 rds/min.
1438 to 1503	20	5990	S		Fired from a benchrest to record time of flight.

Time	No. Rds Fired	Total No. of Rds Fired on Test	Type Fire	Function	Remarks
1530 to 1533	10	6000	S		Fired from a benchrest to check accuracy.

Date: 16 July 1964.

The rifle was disassembled, cleaned, and lubricated.

Mud Test

Date: 17 July 1964.

	20	6020	S

Legend:

S = Semiautomatic.
A = Automatic.
SS = Single shot.
FF = Failure to feed.
FX = Failure to extract.
F2R = Fired 2 rounds with one rearward movement of the trigger.
FFR = Failure to fire.
FBR = Failure of the bolt to remain at rear after last round from magazine.

Note: Function was satisfactory except when noted otherwise.

APPENDIX III - BORE MEASUREMENTS

The bore measurements were made by the Physical Test Laboratory, APG.

Measurements are given in inches.

Distance from End of Flash Suppressor	Before Reliability Test, Fired 27 May 1964				After Reliability Test, Fired 6 July 1964			
	Lands		Grooves		Lands		Grooves	
	Vert	Hor	Vert	Hor	Vert	Hor	Vert	Hor
Rifle: 5.56-mm, M16, No. 040284.								
1.25	0.2195	0.2195	0.2243	0.2241	0.2196	0.2196	0.2243	0.2242
2.00	.2194	.2194	.2241	.2241	.2196	.2196	.2243	.2242
3.00	.2194	.2193	.2241	.2241	.2196	.2196	.2243	.2243
4.00	.2193	.2193	.2241	.2241	.2196	.2196	.2243	.2243
5.00	.2193	.2194	.2241	.2241	.2196	.2196	.2244	.2243
6.00	.2194	.2194	.2241	.2241	.2196	.2196	.2244	.2243
7.00	.2195	.2194	.2241	.2241	.2196	.2196	.2245	.2243
8.00	.2195	.2194	.2241	.2242	.2197	.2197	.2245	.2244
9.00	.2195	.2194	.2242	.2241	.2200	.2200	.2249	.2248
10.00	.2194	.2194	.2241	.2241	.2200	.2200	.2254	.2255
11.00	.2194	.2194	.2241	.2241	.2201	.2202	.2254	.2259
12.00	.2194	.2194	.2241	.2241	.2203	.2205	.2255	.2256
13.00	.2194	.2194	.2241	.2240	.2205	.2203	.2255	.2253
14.00	.2195	.2195	.2241	.2240	.2206	.2205	.2254	.2253
15.00	.2195	.2194	.2242	.2241	.2209	.2208	.2253	.2251
16.00	.2194	.2194	.2241	.2241	.2209	.2210	.2253	.2252
17.00	.2193	.2194	.2241	.2241	.2211	.2211	.2253	.2252
18.00	.2193	.2193	.2241	.2240	.2209	.2208	.2252	.2250
18.35	.2193	.2193	.2240	.2239	.2208	.2207	.2250	.2248
18.85	.2193	.2193	.2240	.2239	.2213	.2211	.2250	.2250
19.10	.2193	.2193	.2239	.2239	.2220	.2220	.2250	.2250
Rifle: 5.56-mm, M16, No. 040297.								
1.25	0.2201	0.2201	0.2250	0.2249	0.2202	0.2201	0.2250	0.2250
2.00	.2199	.2200	.2249	.2249	.2200	.2200	.2248	.2248
3.00	.2200	.2200	.2250	.2249	.2201	.2201	.2249	.2248
4.00	.2200	.2200	.2249	.2249	.2202	.2202	.2250	.2249
5.00	.2200	.2200	.2248	.2248	.2202	.2201	.2249	.2250
6.00	.2200	.2200	.2248	.2248	.2201	.2201	.2249	.2249

Distance from End of Flash Suppressor	Lands		Grooves		Lands		Grooves	
	Vert	Hor	Vert	Hor	Vert	Hor	Vert	Hor
7.00	0.2198	0.2199	0.2248	0.2248	0.2200	0.2200	0.2249	0.2248
8.00	.2199	.2199	.2248	.2248	.2202	.2202	.2250	.2250
9.00	.2200	.2200	.2248	.2248	.2203	.2202	.2254	.2253
10.00	.2200	.2200	.2248	.2248	.2209	.2208	.2265	.2264
11.00	.2199	.2201	.2248	.2248	.2212	.2208	.2265	.2264
12.00	.2198	.2198	.2247	.2248	.2208	.2207	.2259	.2259
13.00	.2198	.2198	.2248	.2248	.2208	.2207	.2256	.2256
14.00	.2198	.2198	.2247	.2247	.2210	.2208	.2257	.2256
15.00	.2199	.2199	.2247	.2247	.2214	.2213	.2256	.2255
16.00	.2198	.2198	.2247	.2247	.2214	.2214	.2256	.2255
17.00	.2198	.2198	.2247	.2247	.2214	.2214	.2255	.2257
18.00	.2197	.2198	.2247	.2247	.2211	.2211	.2258	2258
18.35	.2196	.2197	.2247	.2247	.2210	.2210	.2257	.2256
18.85	.2196	.2197	.2247	.2247	.2212	.2214	.2255	.2256
19.10	.2196	.2197	.2247	.2247	.2219	.2220	.2255	.2256

Round No.	Velocity	Round No.	Velocity
Rifle: 5.56-mm, M16, No. 040284.			
1	3094	1	3040
2	3120	2	3026
3	3053	3	3101
4	3053	4	3040
5	3072	5	2976
6	3120	6	2967
7	3044	7	2994
8	3077	8	2958
9	3040	9	3053
10	3049	10	3040
11	3101	11	3003
12	3091	12	3035
13	3091	13	3016
14	3115	14	3030
15	3091	15	3012
16	3101	16	3049
17	3185	17	3044
18	3135	18	2972
19	3110	19	3044
20	3077	20	3008
Average	3091	Average	3020
Maximum	3185	Maximum	3101
Minimum	3040	Minimum	2958
Extreme variation	145	Extreme variation	143
Mean variation	26.4	Mean variation	27.8

APPENDIX IV - VELOCITY DATA

Before Reliability Test	After Reliability Test
Time Started: 0849.	Time Started: 1440.
Time Completed: 0905.	Time Completed: 1505.
Date: 5 June 1964.	Date: 12 June 1964.
Ammunition Temperature: 70°F.	Ammunition Temperature: 70°F.
Range Temperature: 68°F.	Range Temperature: 80°F.

Instrumental velocities are in fps at 20 feet.

Round No.	Velocity	Round No.	Velocity
Rifle: 5.56-mm, M16, No. 040297			
Cartridge: Ball, caliber .223, lot RA 5027.			
1	3101	1	3012
2	3072	2	3003
3	3077	3	2963
4	3101	4	3026
5	3115	5	2976
6	3091	6	3008
7	3063	7	3026
8	3101	8	3082
9	3077	9	3035
10	3096	10	3063
11	3175	11	2990
12	3086	12	2994
13	3072	13	2950
14	3077	14	3049
15	3072	15	2972
16	3063	16	2994
17	3035	17	3016
18	3058	18	3049
19	3082	19	3053
20	3082	20	3030
Average	3085	Average	3015
Maximum	3175	Maximum	3082
Minimum	3035	Minimum	2950
Extreme variation	140	Extreme variation	132
Mean variation	18.8	Mean variation	28.4

APPENDIX V - ACCURACY TEST DATA

Benchrest

Target measurements are given in inches.

Rifleman	Target No.	MR	MVD	MHD	EVD	EHD	ES

Date: 12 June 1964.
Range: 100 meters.
Fired From: Benchrest.
Cartridge: Ball, caliber .223, lot RA 5027
Target: A, with a 12-inch bull's-eye.

After Reliability

Rifle: 5.56-mm, M16, No. 040284.

G. Hendricks	1	1.49	0.80	1.09	3.0	3.5	3.7

Rifle: 5.56-mm, M16, No. 040297.

G. Hendricks	1	1.03	0.79	0.57	3.3	2.0	3.7

Combat Accuracy Test

All target data are given in inches.

Target No. 1 = Normal benchrest group.
Target No. 2 = Benchrest group starting with a cold and oiled bore.
Target No. 3 = Normal prone group.
Target No. 4 = Benchrest group with a hot barrel.
Target No. 5 = Prone group with a hot barrel.

Target No.	MR	MVD	MHD	EVD	EHD	ES	Group Center from Aiming Point Vert	Group Center from Aiming Point Hor	Measurements from Center of Group No. 1 Group Center Vert	Group Center Hor	Mean	Extreme Shot

Date: 13 and 14 July 1964.
Range: 100 yards.
Direction Of Fire: S.
Rifle: 5.56-mm, M16, No. 040048.
Cartridge: Ball, caliber .223, lot RA 5027.
Target: A, with a 12-inch bull's-eye.
Wind: [illegible] to SW, 1.3 to 7.2 meters per second.
Sky Condition: Scattered clouds to overcast.
Temperature: 24.1 to 29.5°C.

Rifleman: L. Staley.

1	0.99	0.75	0.57	3.3	2.5	3.3	+7.6	-0.2	0.[illegible]	0.0	0.99	1.8
2	1.09	0.87	.54	3.5	2.7	4.4	+7.9	0.0	-0.2	+0.2	1.13	2.5
3	1.34	1.12	.46	4.4	2.1	4.5	+2.0	-0.7	-5.7	-0.4	5.79	7.4
4	0.96	0.67	.52	2.4	2.3	3.0	+4.9	+0.9	-2.[illegible]	+1.1	3.07	4.0
5	1.07	0.95	.43	3.5	1.7	3.5	+0.7	-0.4	-7.0	+0.2	7.00	8.7
Average	1.09	0.87	.50	3.4	2.3	3.7	+4.6	-0.1	-3.1	+0.2	3.60	4.9

31

Target No.	MR	MVD	MHD	EVD	EHD	ES	Group Center from Aiming Point Vert	Group Center from Aiming Point Hor	Measurements from Center of Group No. 1 Group Center Vert	Measurements from Center of Group No. 1 Group Center Hor	Measurements from Center of Group No. 1 Mean	Measurements from Center of Group No. 1 Extreme Shot
Rifleman: R. Connolly.												
1	0.75	0.45	0.56	2.1	3.0	3.6	+3.9	-1.8	0.0	0.0	0.75	2.4
2	1.05	0.65	.75	2.8	4.4	4.9	+5.4	-1.5	+1.5	+0.3	1.81	4.1
3	1.13	0.95	.37	4.9	1.6	4.9	+1.9	-3.2	-2.0	-1.4	2.67	4.2
4	1.32	1.14	.45	5.2	1.7	5.4	+3.7	-0.9	-0.2	+0.9	1.59	3.7
5	0.75	0.55	.43	2.6	1.8	2.8	+1.3	-3.3	-2.6	-1.4	3.03	4.2
Average	1.00	0.75	.51	3.5	2.5	4.3	+3.2	-2.1	-0.6	-0.3	1.97	3.7
Rifleman: G. Hendricks.												
1	0.90	0.68	0.49	2.7	1.9	3.0	+3.3	-1.1	0.0	0.0	0.90	1.9
2	1.17	0.91	.64	3.6	2.0	3.9	+5.0	-2.0	-0.4	-0.8	1.48	2.2
3	1.22	0.55	.95	2.2	3.4	3.9	+1.0	-2.5	-4.4	-1.4	4.70	6.2
4	1.08	0.78	.58	4.7	1.9	4.9	+3.2	-1.5	-2.1	-0.3	2.44	4.3
5	1.24	0.88	.76	2.3	3.7	3.9	-2.2	-1.0	-7.5	+0.1	7.60	8.7
Average	1.12	0.76	.68	3.1	2.6	3.9	+2.5	-1.6	-2.9	-0.5	3.42	4.7
Average for all targets	1.07	0.79	0.57	3.3	2.4	4.0	+3.4	-1.3	-2.2	-0.2	3.00	4.4

Machine Rest

Target measurements are given in inches.

Rifleman	Target No.	MR	MVD	MHD	EVD	EHD	ES
Date: 2 June 1964. Cartridge: Ball, caliber .223, lot RA 5027. Range: 100 yards. Fired From: Machine rest.							
Rifle: 5.56-mm, M16, No. 040048.							
	1	1.16	0.52	0.91	2.5	3.8	3.8
	2	1.05	0.52	0.78	1.9	3.5	3.5
	3	1.75	1.04	1.10	3.5	5.2	5.5
	Average	1.32	0.69	0.93	2.6	4.2	4.3
Rifle: 5.56-mm, M16, No. 040219.							
	1	0.86	0.56	0.50	2.1	2.1	2.2
	2	1.00	0.86	0.42	2.7	2.0	3.3
	3	1.08	0.80	0.58	3.3	2.3	3.5
	Average	0.98	0.74	0.50	2.7	2.1	3.0

Rifleman	Target No.	MR	MVD	MID	EVD	EHD	ES
Rifle: 5.56-mm, M16, No. 040250.							
	1	1.30	0.96	0.58	3.9	3.2	3.9
	2	1.25	0.90	0.61	3.4	2.7	3.5
	3	0.79	0.64	0.41	2.1	2.4	2.5
	Average	1.11	0.83	0.53	3.1	2.8	3.3
Rifle: 5.56-mm, M16, No. 040284.							
	1	0.72	0.35	0.59	1.8	2.4	2.7
	2	1.07	0.80	0.58	2.8	2.4	2.9
	3	0.80	0.38	0.58	1.9	2.2	2.2
	Average	0.86	0.51	0.58	2.2	2.3	2.6
Rifle: 5.56-mm, M16, No. 040297.							
	1	0.93	0.76	0.42	2.9	1.9	3.5
	2	0.88	0.45	0.68	1.8	2.5	2.5
	3	1.20	0.82	0.78	3.3	2.9	3.5
	Average	1.00	0.68	0.63	2.7	2.4	3.2

Benchrest

Date: 17 to 24 June 1964. Cartridge: Ball, caliber .223, lot RA 5027.
Range: 100 meters. Target: A, with a 12-inch bull's-eye.
Fired From: Benchrest.

Rifle: 5.56-mm, M16, No. 040048.							
L. Staley	1	1.05	0.73	0.52	4.5	2.4	4.5
	2	0.89	0.36	0.73	1.5	2.9	2.9
	3	1.15	0.82	0.59	4.4	2.7	4.4
G. Hendricks	1	0.90	0.50	0.66	2.3	2.8	2.9
	2	1.06	0.69	0.53	3.4	2.7	3.4
	3	1.10	0.62	0.71	2.5	3.2	3.5
R. Connolly	1	1.25	0.95	0.56	3.1	2.1	3.2
	2	0.85	0.44	0.64	1.9	2.1	2.3
	3	1.01	0.48	0.72	1.9	3.3	3.3
	Average	1.03	0.62	0.63	2.8	2.7	3.4
Rifle: 5.56-mm, M16, No. 040219.							
L. Staley	1	1.00	0.79	0.51	2.7	1.9	3.3
	2	1.00	0.35	0.85	2.0	3.3	3.3
	3	1.40	0.79	0.79	4.1	3.7	4.1
G. Hendricks	1	1.27	0.82	0.80	3.2	3.3	4.2
	2	1.14	0.72	0.63	4.3	3.3	4.4
	3	1.16	0.81	0.63	3.5	3.1	3.6

Rifleman	Target No.	MR	MVD	MHD	EVD	EHD	ES
R. Connolly	1	1.65	1.39	0.77	5.1	3.1	6.0
	2	1.44	1.14	0.57	3.9	2.8	4.0
	3	1.03	0.80	0.49	3.3	2.1	3.4
	Average	1.23	0.85	0.67	3.6	3.0	4.0
Rifle: 5.56-mm, M16, No. 040250.							
L. Staley	1	1.09	0.93	0.41	3.6	2.1	3.6
	2	0.64	0.23	0.48	1.5	2.2	2.2
	3	0.97	0.71	0.58	3.0	2.3	3.7
G. Hendricks	1	1.26	1.08	0.43	4.3	1.9	4.4
	2	0.91	0.77	0.43	3.2	1.9	3.3
	3	0.88	0.68	0.44	4.2	2.0	4.2
R. Connolly	1	1.10	0.90	0.54	3.6	1.9	3.8
	2	0.85	0.64	0.47	2.4	1.7	2.4
	3	1.03	0.57	0.69	2.4	2.8	3.0
	Average	0.97	0.72	0.50	3.1	2.1	3.4

Dates: 18 and 23 June 1964.
Range: 300 meters.
Direction of Fire: S.
Fired From: Benchrest.
Cartridge: Ball, caliber .223, lot RA 5027.
Target: A, with a 12-inch bull's-eye.
Wind: NE to SW, 0 to 3.6 meters per second.
Sky Condition: Scattered clouds to overcast.
Temperature: 22.2 to 28.1°C.

Rifle: 5.56-mm, M16, No. 040048.							
L. Staley	1	2.29	0.96	1.94	3.3	7.6	7.6
	2	3.20	2.38	1.77	8.0	6.8	8.9
	3	2.80	1.37	2.10	8.1	8.4	9.9
G. Hendricks	1	3.67	3.19	1.40	10.2	4.7	10.5
	2	3.55	2.35	2.06	9.6	9.9	10.8
	3	1.76	1.52	0.76	6.9	2.9	6.9
R. Connolly	1	2.96	2.13	1.73	9.1	5.4	10.0
	2	3.42	2.92	1.60	8.4	4.5	8.8
	3	3.29	2.24	2.08	9.7	9.2	11.0
	Average	2.99	2.12	1.72	8.1	6.6	9.4
Rifle: 5.56-mm, M16, No. 040219.							
L. Staley	1	3.41	2.21	2.13	7.9	7.9	8.8
	2	4.17	2.84	2.36	12.5	10.1	13.3
	3	4.19	2.63	2.93	9.6	11.4	14.6
G. Hendricks	1	4.20	2.43	3.00	8.5	10.8	12.3
	2	5.30	4.32	2.42	10.0	7.0	10.2
	3	2.22	1.34	1.53	5.6	6.2	6.5

Rifleman	Target No.	MR	MVD	MID	EVD	EID	ES
R. Connolly	1	4.20	3.57	1.91	14.4	7.2	15.4
	2	4.29	3.63	1.33	15.2	5.6	15.3
	3	3.77	2.42	2.29	11.8	6.9	11.8
	Average	3.97	2.82	2.21	11.6	8.1	13.0
Rifle: 5.56-mm, M16, No. 040250.							
L. Staley	1	2.74	1.79	1.47	7.2	7.4	7.4
	2	2.82	1.83	1.97	6.1	7.6	9.8
	3	3.47	2.44	2.16	9.6	7.2	10.6
G. Hendricks	1	3.96	2.42	2.82	11.1	9.9	13.0
	2	2.89	1.76	1.88	6.5	6.7	8.9
	3	4.54	3.17	2.45	9.8	10.2	11.3
R. Connolly	1	3.07	1.92	2.08	7.9	7.3	8.5
	2	4.38	1.87	3.62	13.3	6.6	13.3
	3	2.20	1.53	1.29	7.2	6.0	8.3
	Average	3.34	2.08	2.19	8.7	7.7	10.1

Dates: 23 and 24 June 1964.
Range: 500 meters.
Direction Of Fire: S.
Fired From: Benchrest.
Cartridge: Ball, caliber .223, lot RA 5027.
Target: B, with a 20-inch bull's-eye.
Wind: N to S, 0.4 to 2.2 meters per second.
Sky Condition: Overcast.
Temperature: 23.9 to 26.2°C.

Rifleman	Target No.	MR	MVD	MID	EVD	EID	ES
Rifle: 5.56-mm, M16, No. 040048.							
L. Staley	1	6.50	5.18	3.27	19.1	11.9	19.1
	2	4.87	3.55	2.52	14.4	13.6	15.3
	3	6.50	3.87	4.68	14.9	18.9	19.4
G. Hendricks	1	6.57	5.74	2.71	26.8	12.8	27.3
	2	4.97	4.21	2.01	22.0	12.6	25.3
	3	6.45	3.66	4.50	14.8	21.6	23.8
R. Connolly	1	5.17	2.35	3.84	13.6	15.7	15.8
	2	7.49	4.90	4.52	22.9	16.3	23.6
	3	5.02	3.01	3.48	13.1	10.5	14.2
	Average	5.95	4.05	3.50	18.0	14.9	20.4
Rifle: 5.56-mm, M16, No. 040210.							
L. Staley	1	5.36	3.23	4.12	8.9	13.7	15.6
	2	5.37	3.78	2.93	13.4	11.8	14.2
	3	6.68	4.00	4.17	17.9	18.3	20.0
G. Hendricks	1	5.81	3.07	3.90	14.2	18.4	18.8
	2	5.92	3.88	3.14	16.9	15.4	16.9
	3	6.31	3.74	4.44	20.9	19.7	23.8

Rifleman	Target No.	MR	MVD	MID	EVD	EHD	ES
R. Connolly	1	6.23	4.65	3.15	16.3	18.7	18.8
	2	7.11	5.40	3.73	16.4	14.3	20.6
	3	8.13	5.64	4.76	20.6	14.6	22.9
	Average	6.32	4.15	3.82	16.2	16.2	19.1
Rifle: 5.56-mm, M16, No. 040250.							
L. Staley	1	5.22	2.98	3.41	9.9	14.3	14.6
	2	4.84	2.57	3.58	14.4	11.4	15.7
	3	5.48	3.40	3.27	15.6	17.1	17.7
G. Hendricks	1	6.16	4.45	3.84	14.7	11.6	16.7
	2	7.10	5.32	3.61	28.0	13.3	30.8
	3	5.69	3.91	3.05	18.5	12.5	19.4
R. Connolly	1	5.99	3.76	3.88	15.3	17.4	19.6
	2	4.52	3.78	1.55	17.1	8.8	17.3
	3	5.94	4.54	3.25	21.2	14.9	21.9
	Average	5.66	3.86	3.27	17.2	13.5	19.3

Automatic Accuracy Test

Fired in three-round bursts, measurements are given in inches.

	Distance from Center of Bull's-Eye					
	To First Shot		To Second Shot		To Third Shot	
Burst No.	Vert	Hor	Vert	Hor	Vert	Hor
Rifle: 5.56-mm, M16, No. 040048.						
Cartridge: Ball, caliber .223, lot RA 5027.						
Firing Position: Standing.						
Range: 25 meters.						
Date: 19 June 1964.			Rifleman: R. Connolly.			
1	-0.7	-0.4	+40.8	- 4.1	+104.8	+16.0
2	-0.4	-0.5	+38.1	- 8.9	+100.3	+ 9.8
3	-1.2	-0.3	+33.9	- 6.7	+ 86.6	+16.4
4	-0.3	-0.3	+29.0	- 2.6	+ 73.3	+16.5
5	-3.0	-0.4	+21.1	- 8.6	+ 58.9	- 0.3
6	-1.2	0.0	+43.7	- 4.1	+108.7	+25.4
7	-2.4	1.1	+25.7	- 3.1	+ 60.4	+14.8
8	-1.4	+1.0	+27.4	- 4.4	+ 65.5	+ 9.7
9	-0.8	0.0	+43.6	+ 1.6	+107.2	+27.8
10	0.0	-0.3	+43.7	+ 0.3	+110.7	+23.9
	EV 113.7		EH 36.7		ES 116.3	

Thirty-shot group. Mean from center of bull's-eye, 42.77. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 62.30.

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Date. 1 July 1964.			Rifleman: L. Staley.			
1	-0.1	-0.1	+42.8	+12.5	+ 96.6	+34.6
2	+0.6	0.0	+42.8	+13.0	+ 94.7	+31.2
3	+0.5	+0.4	+41.6	+12.4	+ 92.8	+31.3
4	+0.9	-1.0	+44.1	+ 7.7	+ 97.0	+30.1
5	-0.7	-1.3	+34.1	+ 8.3	+ 88.6	+39.5
6	-0.3	-0.8	+42.9	+ 9.8	+100.7	+36.0
7	+0.4	+0.3	+44.0	+ 9.2	+104.5	+32.3
8	-0.6	+0.8	+42.1	+10.5	+ 98.1	+33.5
9	+1.1	+0.3	+42.9	+10.5	+101.0	+37.8
10	+0.4	0.0	+42.4	+ 9.8	+102.3	+37.6
	EV 105.2		EH 40.5		ES 110.2	

Thirty-shot group. Mean from center of bull's-eye, 49.06. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 73.06.

Date: 7 July 1964.			Rifleman: G. Hendricks.			
1	-2.7	-0.5	+37.2	+13.1	+103.5	+42.4
2	-1.1	-0.6	+40.0	+20.7	+103.1	+50.1
3	-1.3	-1.0	+40.1	+18.1	+100.0	+52.4
4	-2.0	-1.3	+33.7	+15.6	+ 93.5	+49.3
5	-0.8	-0.3	+37.2	+21.3	+ 95.1	+51.3
6	-1.6	-0.2	+42.9	+19.8	+103.7	+52.7
7	-1.7	-1.1	+37.4	+14.9	+ 99.1	+47.9
8	+0.1	-0.8	+42.6	+18.8	+109.5	+57.3
9	+0.3	-0.9	+44.7	+19.0	+102.7	+52.6
10	-1.7	-0.8	+40.1	+17.9	+105.8	+53.7
	EV 112.4		EH 58.6		ES 126.8	

Thirty-shot group. Mean from center of bull's-eye, 53.39. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 80.79.

Rifle: 5.56-mm, M16, No. 040219.
Cartridge: Ball, caliber .223, lot RA 5027.
Firing Position: Standing.
Range: 25 meters.

Date: 19 June 1964.			Rifleman: R. Connolly.			
1	-1.2	0.0	+42.9	+ 0.5	+107.2	+30.5
2	-1.1	-0.8	+40.6	- 1.5	+105.7	+23.6

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
3	-2.4	-0.3	+30.6	- 2.0	+ 87.2	+19.4
4	-1.9	0.0	+32.6	- 4.0	+ 87.9	+10.9
5	-1.4	-1.1	+32.6	- 5.0	+ 80.9	+ 8.6
6	-3.2	-0.2	+34.4	- 3.5	+ 92.7	+17.8
7	-2.3	-0.1	+24.9	-10.6	+ 75.1	- 1.8
8	-3.0	-1.1	+27.2	- 7.5	+ 71.5	- 1.6
9	-1.8	-0.1	+33.1	- 3.3	+ 86.7	+11.6
10	-1.7	-1.2	+30.8	- 8.1	+ 79.0	+10.1
	EV 110.4		EH 41.1		ES 115.0	

Thirty-shot group. Mean from center of bull's-eye, 41.55. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 63.25.

Date: 2 July 1964. Rifleman: L. Stalev.

1	-0.7	-0.1	+38.7	+ 9.4	+ 92.7	+34.7
2	-1.4	-0.5	+45.8	+ 8.8	+102.9	+38.9
3	-1.5	-0.1	+49.2	+ 8.7	+109.0	+30.1
4	-0.9	-0.4	+47.8	+ 6.6	+106.8	+26.7
5	-0.9	1.0	+45.9	+ 4.4	+102.2	+28.8
6	-1.9	-1.0	+44.8	+ 5.3	+102.9	+24.0
7	-0.8	-0.6	+44.4	+ 1.9	+102.0	+25.1
8	-0.6	-0.4	+46.9	+ 4.3	+107.6	+28.9
9	-0.8	-0.5	+41.8	+ 2.8	+103.1	+27.6
10	-1.0	-1.4	+37.1	+ 1.2	+ 96.8	+26.2
	EV 110.9		EH 40.3		ES 115.2	

Thirty-shot group. Mean from center of bull's-eye, 50.90. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 76.81.

Date: 7 July 1964. Rifleman: G. Hendricks.

1	-0.9	-1.1	+40.6	+13.7	+100.7	+47.9
2	-0.4	-0.7	+37.7	+18.3	+ 89.3	+52.2
3	-0.8	-0.2	+40.7	+17.8	+ 95.9	+45.6
4	+0.2	+0.4	+39.7	+14.4	+ 92.6	+47.6
5	-0.1	0.0	+43.2	+19.2	+104.7	+53.1
6	-1.3	0.0	+44.5	+17.2	+110.2	+50.6
7	-0.7	-0.2	+42.8	+19.3	+104.2	+56.3
8	-0.2	-0.1	+39.3	+17.8	+ 93.4	+54.1
9	-0.4	+0.2	+37.1	+17.3	+ 91.1	+47.6
10	-0.7	0.0	+39.1	+20.1	+ 93.6	+53.2
	EV 111.5		EH 57.4		ES 123.1	

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Thirty-shot group. Mean from center of bull's-eye, 51.35. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 78.16.						
Rifle: 5.56-mm, M16, No. 040250. Cartridge: Ball, caliber .223, lot RA 5027. Firing Position: Standing. Range: 25 meters.						
Date: 19 June 1964.				Rifleman: R. Connolly.		
1	-0.8	+0.7	+41.6	- 8.6	+112.6	+12.6
2	-1.7	+0.2	+34.3	- 7.0	+ 93.2	+ 2.0
3	+0.1	-0.4	+30.6	- 1.2	+ 84.0	+17.2
4	-0.5	0.0	+38.6	- 3.4	+ 96.1	+18.3
5	-0.8	+0.7	+29.5	- 5.3	+ 81.4	+ 8.3
6	-1.3	+0.7	+41.6	- 5.2	+112.3	+12.6
7	-0.8	-0.6	+28.3	- 7.2	+ 76.4	+ 6.1
8	-1.8	+0.9	+27.1	- 7.6	+ 79.6	+ 3.0
9	-1.2	-0.3	+28.9	- 5.7	+ 81.7	+ 9.6
10	-1.1	-0.5	+24.9	- 8.4	+ 71.0	+ 4.2
	EV 114.4		EH 26.9		ES 115.1	
Thirty-shot group. Mean from center of bull's-eye, 41.37. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 62.50.						
Date: 2 July 1964.				Rifleman: L. Staley.		
1	-0.3	-0.2	+46.7	+ 4.3	+106.6	+22.8
2	-0.7	+0.8	+45.3	+ 6.4	+104.0	+30.4
3	+1.0	+0.2	+38.7	- 5.0	+ 99.4	+ 8.4
4	-0.4	+0.4	+48.4	+ 4.0	+107.3	+23.1
5	-0.9	+0.1	+46.0	+ 6.0	+105.0	+31.7
6	-0.7	-0.9	+40.0	- 1.4	+ 96.5	+27.4
7	+0.2	+0.1	+45.2	+ 1.3	+101.0	+20.7
8	-0.5	+1.2	+47.2	+ 2.7	+107.6	+27.5
9	-1.0	-0.4	+44.7	+ 6.4	+101.7	+28.5
10	-0.3	-0.1	+44.0	+ 2.4	+102.0	+23.1
	EV 108.6		EH 36.7		ES 112.2	
Thirty-shot group. Mean from center of bull's-eye, 50.65. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 75.82.						

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Date: 7 July 1964.			Rifleman: G. Hendricks.			
1	-0.5	-0.3	+41.4	+16.7	+100.3	+51.7
2	-0.8	0.0	+40.6	+15.6	+104.0	+49.1
3	-0.7	-1.0	+40.4	+11.5	+102.4	+47.1
4	-1.4	+0.6	+34.3	+20.3	+ 82.7	+42.0
5	-0.7	+0.6	+38.0	+17.8	+ 87.9	+44.4
6	-1.7	-0.3	+40.4	+15.0	+107.8	+48.3
7	-0.5	+0.7	+42.2	+18.0	+10[illegible].1	+47.5
8	-0.4	+0.4	+34.4	+17.6	+ 81.6	+41.2
9	+0.5	+0.4	+42.8	+16.8	+ 92.0	+51.9
10	-1.2	+0.1	+39.9	+16.1	+100.3	+48.2
	EV 109.5		EH 52.9		ES 120.4	

Thirty-shot group. Mean from center of bull's-eye, 50.57. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 75.98.

Rifle: 5.56-mm, M16, No. 040048.
Cartridge: Ball, caliber .223, lot RA 5027.
Firing Position: Prone.
Range: 50 meters.

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Date: 22 June 1964.			Rifleman: R. Connolly.			
1	-0.3	+0.5	+63.2	-15.6	+110.9	- 2.0
2	+0.4	+0.5	+66.4	- 7.0	+ 90.0	+11.4
3	+0.7	+0.1	+57.2	-10.5	+ 78.7	+ 5.3
4	+0.6	-0.1	+54.7	-15.2	+ 85.9	- 6.2
5	+0.7	+0.4	+44.2	-17.0	+ 68.1	- 6.6
6	+0.1	+0.6	+58.5	-24.1	+ 80.4	-23.4
7	+0.9	+0.4	+67.4	-14.2	+ 94.4	- 3.3
8	+0.4	+0.1	+52.1	-26.2	+ 79.4	-22.8
9	+0.8	+0.4	+54.2	-26.4	+ 78.2	-29.5
10	-0.5	+0.2	+49.4	-25.8	+ 74.8	-26.9
	EV 111.4		EH 40.9		ES 111.4	

Thirty-shot group. Mean from center of bull's-eye, 48.84. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 73.43.

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Date: 10 July 1964.				Rifleman: L. Staley.		
1	+1.1	-0.7	+60.6	+ 1.7	+ 77.5	+ 1.2
2	-0.1	+0.4	+46.4	+ 4.2	+ 53.3	+ 6.7
3	-0.1	+1.1	+45.6	+ 0.3	+ 58.6	-10.4
4	+1.2	+0.2	+59.4	- 1.0	+ 78.0	- 5.3
5	-0.1	+0.7	+58.2	- 3.1	+ 77.0	+ 1.3
6	+1.1	-1.0	+57.0	- 6.4	+ 72.4	- 3.6
7	-0.6	-0.8	+46.3	- 2.1	+ 50.5	+ 2.8
8	-0.7	+0.5	+41.2	- 5.9	+ 45.0	- 2.7
9	-1.1	+0.5	+52.0	- 4.3	+ 59.3	- 2.0
10	-0.1	+0.5	+68.0	+ 7.9	+ 83.1	+11.8
	EV 78.1		EH 22.2		ES 84.9	

Thirty-shot group. Mean from center of bull's-eye, 40.08. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 59.62.

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Date: 9 July 1964.				Rifleman: G. Hendricks.		
1	-0.3	-0.2	+46.1	+ 3.3	+ 44.7	+17.2
2	-0.1	-0.5	+44.8	+ 6.0	+ 49.1	+14.3
3	-0.3	0.0	+58.1	- 7.2	+ 74.0	- 4.0
4	-1.1	0.0	+53.7	- 8.0	+ 60.3	- 7.6
5	-0.6	-0.2	+48.4	- 8.9	+ 50.8	- 7.0
6	-1.2	-0.8	+56.1	-16.1	+ 62.2	-14.2
7	-0.2	+0.3	+51.4	-10.0	+ 50.0	- 9.4
8	-1.0	+0.2	+51.2	- 8.2	+ 56.3	- 1.9
9	-0.4	-0.5	+58.5	-12.3	+ 60.9	-14.2
10	-0.2	-1.1	+50.0	-11.6	+ 59.8	- 7.5
	EV 75.6		EH 33.3		ES 75.6	

Thirty-shot group. Mean from center of bull's-eye, 37.46. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 55.42.

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Rifle: 5.56-mm, M16, No. 040219.						
Cartridge: Ball, caliber .223, lot RA 5027.						
Firing Position: Prone.						
Range: 50 meters.						
Date: 22 June 1964.			Rifleman: R. Connolly.			
1	+0.4	-1.6	+62.6	-25.4	+102.9	-25.4
2	-1.0	-0.3	+37.8	-18.9	+ 70.8	-25.0
3	-0.9	-0.4	+54.5	-26.0	+ 82.6	-34.0
4	-1.5	-1.0	+64.5	-25.2	+ 85.5	-29.3
5	-1.0	+0.3	+53.5	-22.3	+ 74.7	-17.9
6	-1.3	-0.6	+50.4	-22.4	+ 75.6	-24.4
7	+1.1	-0.8	+58.4	-19.0	+ 93.2	-21.6
8	-0.5	0.0	+44.3	-30.1	+ 71.1	-30.9
9	-0.8	-0.6	+51.1	-20.8	+ 64.8	-12.8
10	-0.5	-0.5	+57.9	-19.6	+ 89.3	-12.3
	EV 104.4		EH 34.3		ES 106.9	

Thirty-shot group. Mean from center of bull's-eye, 47.99. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 71.78.

Date: 10 July 1964.			Rifleman: [illegible]. Staley.			
1	+1.0	+0.2	+67.8	- 3.3	+ 80.1	6.1
2	-1.1	-0.3	+52.1	- 2.2	+ 55.9	- 4.4
3	-0.9	-0.4	+53.5	+ 2.2	+ 60.0	- 0.8
4	-0.9	0.0	+44.2	+ 4.8	+ 51.5	+ 6.3
5	+0.2	-0.5	+56.1	- 1.3	+ 71.0	- 1.0
6	-0.9	+0.1	+56.0	+ 4.1	+ 83.3	+10.7
7	+0.8	-0.2	+45.0	+ 5.4	+ 60.0	+ 7.3
8	+0.8	+0.2	+55.0	+10.2	+ 69.5	+17.4
9	+0.9	-0.4	+37.8	+ 3.0	+ 45.7	+ 3.6
10	-0.5	-0.3	+38.5	+ 7.9	+ 43.0	+ 7.9
	EV 84.4		EH 23.5		ES 85.0	

Thirty-shot group. Mean from center of bull's-eye, 38.34. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 57.10.

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Date: 9 July 1964.			Rifleman: G. Hendricks.			
1	+0.2	+0.2	+44.7	+ 4.4	+ 49.4	+ 9.2
2	+1.3	0.0	+45.6	- 0.3	+ 48.0	+ 7.5
3	+1.1	-0.4	+53.1	- 5.3	+ 62.3	+ 2.6
4	+1.2	+0.3	+47.8	- 4.4	+ 60.0	+ 2.4
5	+0.6	-0.7	+50.5	-10.2	+ 50.5	- 8.6
6	+0.5	-1.2	+50.6	- 5.3	+ 48.0	- 3.4
7	+0.8	-0.4	+57.6	-10.2	+ 62.6	- 6.0
8	-0.6	-1.4	+50.4	- 6.8	+ 52.2	- 3.0
9	0.0	-0.3	+49.3	- 2.5	+ 47.3	+12.1
10	+1.1	-2.1	+54.2	-10.2	+ 53.6	- 2.0
	EV 63.2		EH 22.3		ES 63.3	

Thirty-shot group. Mean from center of bull's-eye, 35.04. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 51.28.

Rifle: 5.56-mm, M16, No. 040250.
Cartridge: Ball, caliber .223, lot RA 5027.
Firing Position: Prone.
Range: 50 meters.

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Date: 22 June 1964.			Rifleman: R. Connolly.			
1	+0.5	+0.5	+51.3	-17.4	+ 68.8	-15.2
2	-0.9	+0.1	+50.2	- 7.0	+ 66.0	- 2.9
3	-0.4	+0.5	+57.9	-13.4	+ 78.9	- 2.3
4	-0.6	+0.9	+62.2	-21.2	+ 95.8	-24.8
5	+0.5	+0.3	+84.4	-16.4	+119.0	-20.0
6	-0.5	-0.1	+47.1	-33.9	+ 74.9	-38.2
7	-0.3	+0.9	+58.4	-24.6	+ 90.5	-25.6
8	-2.6	-0.5	+22.2	-21.5	+ 45.7	-15.4
9	+0.4	+0.6	+56.6	-24.8	+ 83.1	-29.6
10	+0.6	-0.7	+61.3	-29.3	+ 94.2	-36.9
	EV 121.6		EH 39.1		ES 122.9	

Thirty-shot group. Mean from center of bull's-eye, 48.54. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 72.86.

31

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Date: 10 July 1964.			Rifleman: L. Staley.			
1	-0.8	-0.2	+58.0	+ 1.0	+ 76.5	+14.8
2	0.0	+0.4	+62.0	+ 8.5	+ 76.3	+17.7
3	0.0	0.0	+57.7	+ 7.2	+ 75.2	+10.8
4	+0.7	-0.4	+48.2	+ 1.3	+ 62.0	+ 2.9
5	+0.3	+0.4	+56.9	+ 4.3	+ 78.1	+ 6.9
6	-0.3	+0.6	+60.8	+ 2.0	+ 74.1	+ 5.5
7	0.0	+0.2	+55.4	+ 5.2	+ 71.9	+ 8.0
8	+0.3	0.0	+69.1	+ 8.4	+ 93.1	+10.2
9	+0.6	-0.8	+56.2	+ 3.8	+ 81.0	+11.2
10	-1.2	-1.0	+63.9	+ 0.5	+100.8	- 0.3
	EV 102.0		EH 18.7		ES 102.0	

Thirty-shot group. Mean from center of bull's-eye, 46.39. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 69.19.

Burst No.	Distance from Center of Bull's-Eye: To First Shot Vert	To First Shot Hor	To Second Shot Vert	To Second Shot Hor	To Third Shot Vert	To Third Shot Hor
Date: 10 July 1964.			Rifleman: G. Hendricks.			
1	+1.5	-0.2	+44.9	+ 9.4	+ 33.2	+23.4
2	-0.6	+0.2	+49.9	- 0.8	+ 38.3	+12.0
3	-0.3	+0.4	+40.8	- 0.7	+ 37.5	+13.2
4	+0.1	-0.7	+45.1	- 3.4	+ 40.6	+ 7.0
5	+0.4	-0.7	+47.6	- 6.2	+ 51.9	+ 7.5
6	-0.1	-0.3	+45.1	- 2.5	+ 45.3	+14.0
7	+0.8	-0.4	+42.6	+ 2.5	+ 45.4	+15.2
8	-0.5	-0.9	+30.7	- 0.3	+ 50.9	+17.0
9	-0.7	-0.5	+46.9	- 0.3	+ 51.3	+15.1
10	+0.6	-0.8	+42.6	- 2.0	+ 45.0	+11.7
	EV 32.6		EH 29.6		ES 54.3	

Thirty-shot group. Mean from center of bull's-eye, 30.91. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second and third rounds), 45.78.

Fired in five-round bursts, measurements are given in inches.

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Rifle: 5.56-mm, M16, No. 040048.										
Cartridge: Ball, caliber .223, lot RA 5027.										
Firing Position: Standing.										
Range: 25 meters.										
Date: 25 June 1964.						Rifleman: R. Connolly.				
1	-2.0	-0.6	+35.5	- 4.1	+ 95.6	+15.1	+161.8	+37.3	[a]	-
2	-1.3	0.0	+36.6	- 2.1	+101.3	+18.1	+167.9	+41.3	+222.5	+67.0
3	-0.6	+0.2	+36.0	- 4.1	+101.0	+12.1	+168.2	+33.7	[a]	-
4	-0.2	-0.5	+41.1	- 5.1	+112.9	+16.0	+185.6	+40.8	[a]	-
5	-0.9	-0.1	+37.3	- 2.4	+103.0	+17.3	+186.7	+38.5	[a]	-
6	-0.7	-0.6	+39.1	- 3.2	+103.5	+15.5	+171.6	+41.4	[a]	-
7	-0.2	0.0	+33.5	- 1.7	+ 96.5	+18.3	+166.0	+41.7	[a]	-
8	+0.4	-0.6	+40.8	- 4.1	+106.0	+17.4	+170.7	+40.5	[a]	-
9	-1.1	0.0	+36.7	- 1.1	+101.5	+19.6	+172.0	+45.2	[a]	-
10	-0.4	0.0	+37.3	- 3.1	+100.5	+14.8	+169.0	+36.0	[a]	-
EV -				EH -		ES -				
Date: 30 June 1964.						Rifleman: L. Staley.				
1	-1.1	-0.5	+38.5	+10.0	+ 94.5	+32.3	+145.4	+51.8	+194.7	+ 70.4
2	-1.6	+1.0	+39.7	+13.5	+ 97.8	+30.8	+155.6	+44.3	+212.7	+ 59.2
3	+0.3	-1.2	+40.0	+ 9.3	+ 98.4	+37.5	+146.4	+49.1	+202.3	+ 74.8
4	-1.9	-1.4	+38.9	+ 9.1	+ 92.0	+24.1	+133.0	+32.9	+171.6	+ 41.3
5	-0.2	-1.4	+42.8	+11.9	+ 95.4	+30.6	+134.2	+42.0	+163.5	+ 54.4
6	-0.5	+0.4	+42.8	+18.1	+102.0	+39.8	+157.3	+52.6	+195.0	+ 55.4
7	-1.6	-0.2	+38.9	+16.0	+ 99.0	+41.0	+152.8	+56.8	+197.0	+ 66.3
8	+0.1	+0.3	+40.8	+14.6	+ 98.1	+37.5	+147.6	+51.8	+185.3	+ 63.7
9	+0.5	-0.8	+45.3	+11.3	+ 99.5	+32.7	+138.6	+40.1	+174.5	+ 48.3
10	-1.3	-0.9	+39.4	+10.0	+ 99.2	+31.2	+128.9	+46.4	+168.8	+ 61.4
EV 214.6				EH 76.2		ES 222.5				

Fifty-shot group. Mean from center of bull's-eye, 97.72. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 123.21.

[a]Missed the 20-foot-high by 12-foot-wide target.

38

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Date: 7 July 1964.							Rifleman: G. Hendricks.			
1	-2.2	-1.5	+44.8	+22.4	+ 77.2	+ 33.0	+108.5	+61.3	+186.2	+102.1
2	-0.1	-1.2	+42.6	+15.1	+ 94.4	+ 49.4	+141.1	+78.3	+177.0	+106.0
3	+0.4	-0.9	+40.6	+21.[illegible]	[illegible]5.3	+ 54.5	+135.8	+80.8	[a]	-
4	-1.0	-0.4	+34.6	+14.4	+ 85.2	+ 28.2	+145.0	+44.0	+222.3	+ 73.5
5	-0.4	-0.9	+41.1	+20.3	+ 91.9	+ 50.6	+153.8	+81.4	[a]	-
6	-1.4	-1.0	+37.0	+18.6	+ 86.3	+ 52.2	+142.4	+80.2	+215.1	+119.9
7	-0.5	-0.4	+38.2	+22.0	+ 90.0	+ 50.5	+150.7	+77.8	+227.4	+118.1
8	-1.3	-1.1	+43.4	+16.3	+ 74.3	+ 37.6	+107.8	+54.2	+187.5	+ 95.6
9	-0.1	-1.0	+38.2	+23.6	+ 85.0	+ 57.7	+152.2	+92.4	[a]	-
10	-0.8	-0.8	+40.4	+17.0	+ 79.9	+ 36.1	+ 97.2	+54.2	+173.6	+ 87.4

EV - EII - ES -

Rifle: 5.56-mm, M16, No. 040219.
Cartridge: Ball, caliber .223, lot RA 5027.
Firing Position: Standing.
Range: 25 meters.

Burst No.	First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Date: 25 June 1964.							Rifleman: R. Connolly.			
1	-0.8	+0.6	+38.2	- 1.8	+106.4	+23.1	+180.9	+47.4	[a]	-
2	-0.5	-0.7	+38.3	- 0.4	+106.2	+24.9	+175.7	+48.3	[a]	-
3	-0.1	-1.6	+38.7	- 3.0	+102.8	+12.0	+175.7	+34.5	[a]	-
4	-1.0	-1.0	+40.2	- 2.8	+105.4	+18.5	+181.3	+37.6	[a]	-
5	+0.2	-1.2	+37.9	- 2.5	+101.5	+20.2	+170.1	+42.0	[a]	-
6	+0.1	-1.1	+43.3	- 5.4	+108.3	+13.3	+177.6	+33.7	[a]	-
7	-0.4	-1.0	+38.4	- 4.0	+100.0	+14.4	+163.6	+34.8	[a]	-
8	-0.4	-1.7	+39.9	- 5.6	+106.7	+13.8	+180.8	+36.9	[a]	-
9	+1.4	-0.8	+40.4	- 3.3	+106.5	+16.8	+175.6	+39.2	[a]	-
10	-0.2	-0.6	+36.8	- 4.2	+101.7	+18.5	+173.2	+43.0	[a]	-

EV - EII - ES -

[a] Missed the 20-foot-high by 12-foot-wide target.

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Date:	1 July 1964.					Rifleman:	L. Staley.			
1	-0.6	-0.8	+41.3	+13.2	+ 94.4	+41.6	+145.0	+ 65.2	+196.4	+ 86.7
2	-1.2	-0.6	+38.9	+16.0	+ 92.3	+39.8	+136.2	+ 56.0	+166.6	+ 66.2
3	-1.5	-1.3	+38.8	+13.6	+ 95.3	+36.5	+154.0	+ 56.4	+206.7	+ 61.7
4	-1.3	+0.2	+42.2	+13.5	+101.5	+35.7	+152.7	+ 46.0	+201.2	+ 47.6
5	-1.4	-1.8	+42.8	+15.0	+100.3	+40.4	+140.1	+ 62.5	+170.7	+ 79.6
6	-1.1	+1.1	+42.0	+14.9	+ 99.0	+31.1	+152.9	+ 38.5	+198.2	+ 41.2
7	-0.7	-1.2	+39.8	+15.4	+ 97.6	+41.9	+148.9	+ 64.7	+185.7	+ 74.4
8	-2.6	+0.6	+37.8	+10.5	+ 90.9	+39.4	+135.2	+ 31.7	+177.3	+ 39.8
9	-0.9	-0.5	+41.6	+15.2	+ 99.5	+40.4	+152.4	+ 58.0	+189.7	+ 65.4
10	-0.3	-1.5	+43.5	+13.8	+ 98.0	+37.8	+136.6	+ 51.1	+172.0	+ 62.0
	EV 209.3		EH 88.5		ES 217.5					

rifty-shot group. Mean from center of bull's-eye, 100.02. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 125.96.

Date:	10 July 1964.					Rifleman:	G. Hendricks.			
1	-0.4	-0.5	+39.9	+17.5	+ 95.2	+47.0	+162.9	+ 73.5	[a]-	-
2	-1.4	-0.4	+36.4	+21.4	+ 84.2	+36.3	+141.0	+ 61.8	+214.3	+ 92.3
3	-0.1	-0.9	+38.3	+23.0	+ 84.1	+48.0	+139.5	+ 80.7	+212.7	+117.2
4	-1.4	-0.1	+39.5	+23.2	+ 87.7	+45.8	+136.8	+ 69.9	+197.1	+ 99.0
5	-1.1	-0.1	+37.0	+27.0	+ 90.1	+46.2	+149.1	+ 75.2	+207.8	+106.4
6	-0.9	-1.2	+43.2	+22.4	+100.0	+50.7	+157.2	+ 83.0	+224.0	+114.6
7	-0.6	+0.1	+47.0	+19.4	+115.6	+52.2	+193.3	+ 93.1	[a]-	-
8	-1.3	-1.0	+39.5	+23.7	+ 96.0	+46.0	+155.9	+ 72.8	+215.5	+ 97.8
9	+0.2	-0.2	+40.0	+23.0	+ 91.2	+47.6	+149.2	+ 77.3	+212.3	+112.9
10	-1.1	-0.7	+46.0	+25.7	+116.5	+59.8	+202.9	+105.4	[a]-	-
	EV -		EH -		ES -					

[a]Missed the 20-foot-high by 12-foot-wide target.

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Rifle: 5.56-mm, M16, No. 040250.										
Cartridge: Ball, caliber .223, lot RA 5027.										
Firing Position: Standing.										
Date: 25 June 1964.						Rifleman: R. Connolly				
1	-0.8	-0.4	+35.3	- 9.0	+100.0	+14.9	+168.2	+41.5	[a]	-
2	-1.0	-0.1	+35.4	- 3.2	+ 98.8	+15.0	+171.9	+38.0	[a]	-
3	-0.6	-1.6	+36.0	-12.3	+104.5	+ 9.5	+177.2	+35.0	[a]	-
4	-1.0	-0.3	+42.2	- 3.2	+108.3	+16.2	+177.0	+38.9	[a]	-
5	-0.4	-1.2	+38.5	- 3.1	+103.3	+23.4	+172.6	+51.8	[a]	-
6	+0.2	-0.7	+41.0	- 7.0	+106.7	+ 7.6	+177.9	+27.5	[a]	-
7	-0.6	-0.2	+39.8	- 5.6	+103.1	+11.9	+175.4	+36.5	[a]	-
8	-0.2	-0.6	+38.8	- 6.1	+101.1	+12.0	+171.3	+36.2	[a]	-
9	-0.8	+0.3	+35.8	- 7.9	+ 99.7	+ 9.0	+169.5	+25.6	[a]	-
10	0.0	-0.4	+38.8	- 2.2	+ 99.5	+16.1	+163.1	+39.7	[a]	-
EV -		EH -		ES -						
Date: 1 July 1964.						Rifleman: L. Staley.				
1	-0.5	-0.9	+38.8	+11.9	+ 92.0	+39.8	+144.2	+64.0	+198.3	+84.1
2	-1.3	+0.1	+43.0	+12.0	+104.8	+31.9	+172.8	+46.2	[a]	-
3	-0.6	-0.1	+43.0	+13.0	+100.5	+40.5	+148.7	+59.8	+180.3	+66.9
4	-0.3	-0.6	+44.7	+13.3	+102.0	+39.8	+154.5	+50.8	+198.1	+52.1
5	-1.1	-0.2	+44.4	+12.2	+104.2	+36.4	+163.2	+50.6	+198.0	+56.3
6	-1.3	-0.9	+44.5	+11.5	+102.5	+37.6	+157.6	+60.8	+196.6	+77.4
7	-1.0	0.0	+39.1	+14.7	+ 98.5	+41.0	+151.6	+57.3	+192.5	+64.7
8	-0.8	-0.5	+42.0	+13.0	+ 98.5	+38.4	+147.1	+53.4	+188.8	+72.0
9	+0.3	+0.5	+42.5	+11.5	+ 99.3	+34.4	+157.5	+42.8	+201.8	+47.6
10	-1.5	-1.2	+45.7	+ 9.4	+102.5	+31.0	+154.5	+49.4	+204.6	+68.1
EV -		EH -		ES -						

[a]Missed the 20-foot-high by 12-foot-wide target.

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Date:	10 July 1964.					Rifleman:	G. Hendricks.			
1	-0.5	-0.4	+37.6	+20.1	+ 86.3	+52.4	+134.9	+79.7	+185.3	+114.2
2	-0.5	+0.2	+37.5	+17.7	+ 86.9	+43.5	+140.7	+68.8	+208.4	+ 98.4
3	-0.2	+0.1	+35.0	+26.8	+ 80.1	+51.5	+131.1	+76.6	+202.6	+108.9
4	-1.1	-0.2	+41.7	+16.0	+105.6	+49.3	+180.9	+87.5	[a]	-
5	-0.7	-0.5	+38.2	+26.8	+ 89.6	+57.9	+151.5	+91.1	[a]	-
6	-1.8	+1.0	+40.9	+23.5	+102.0	+46.7	+182.3	+70.5	[a]	-
7	-0.3	-0.1	+38.6	+24.3	+ 93.1	+46.0	+155.2	+65.3	[a]	-
8	0.0	+0.4	+36.7	+16.2	+ 97.1	+44.2	+176.8	+72.0	[a]	-
9	+0.1	-0.2	+36.3	+13.9	+ 87.7	+32.3	+146.6	+54.6	+214.4	+ 83.7
10	-2.1	-0.2	+35.0	+23.3	+ 78.0	+50.2	+119.4	+78.4	+174.4	+108.9
	EV -			EH -			ES -			

Rifle: 5.56-mm, M16, No. 040048.
Cartridge: Ball, caliber .223, lot RA 5027.
Firing Position: Prone.
Range: 50 meters.

Date:	25 June 1964.					Rifleman:	R. Connolly.			
1	+1.0	-0.3	+57.7	-12.5	+ 70.9	- 0.4	+ 62.2	+ 0.1	+ 78.0	- 1.7
2	-0.9	+1.1	+58.0	-22.4	+ 77.2	-18.2	+ 55.3	-16.4	+ 63.4	- 27.5
3	0.0	+0.2	+47.7	-11.9	+ 62.9	+ 9.8	+ 50.8	+21.8	+ 65.6	+ 17.7
4	+0.4	+0.9	+62.1	- 8.0	+ 83.0	+10.1	+ 73.2	+21.7	+ 83.4	+ 15.2
5	0.0	-0.4	+40.3	-19.5	+ 53.3	- 9.2	+ 45.0	- 5.9	+ 47.9	- 11.0
6	-0.2	+0.5	+68.9	- 6.1	+ 92.2	+14.2	+ 76.4	+26.5	+ 85.4	+ 16.4
7	+0.4	+0.5	+60.7	-12.1	+ 87.2	- 2.5	+ 76.0	+ 8.8	+ 72.5	+ 8.0
8	+1.8	-0.1	+59.2	-17.6	+ 84.4	- 8.9	+ 73.7	- 3.8	+ 81.0	- 7.1
9	+1.4	0.0	+58.1	-20.4	+ 84.1	- 8.9	+ 78.2	+ 4.0	+ 80.6	+ 7.2
10	-0.5	+0.3	+71.5	-16.2	+ 98.0	0.0	+ 82.3	+14.7	+ 90.2	+ 16.0
	EV 98.9			EH 54.0			ES 98.9			

Fifty-shot group. Mean from center of bull's-eye, 56.3. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 70.5.

[a]Missed the 20-foot-high by 12-foot-wide target.

40

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Date: 2 July 1964.					Rifleman: L. Staley.					
1	+1.3	-0.3	+68.8	- 1.8	+ 91.7	- 8.9	+102.7	-20.4	+103.3	- 18.8
2	-1.1	-0.6	+61.1	- 2.0	+ 76.4	- 2.9	+ 89.6	-21.0	+ 94.1	- 22.1
3	-0.9	-0.8	+59.2	+ 1.5	+ 74.3	+10.7	+ 82.3	+ 1.2	+ 75.7	+ 4.2
4	-0.6	-0.9	+61.0	+ 6.0	+ 81.3	+ 9.1	+ 90.1	-14.2	+ 87.0	- 21.4
5	-0.6	+0.4	+56.7	+ 3.2	+ 83.6	+ 8.4	+ 98.0	- 2.7	+ 95.6	- 1.1
6	-0.1	-0.3	+63.4	- 9.8	+ 98.1	- 5.5	+119.4	-24.4	+126.6	- 21.4
7	-1.0	+0.3	+53.1	- 5.6	+ 72.1	- 3.8	+ 89.5	-22.6	+ 90.0	- 12.3
8	-2.4	+1.1	+65.1	- 9.7	+102.9	-18.8	+127.5	-40.8	+ 97.4	- 24.7
9	-1.1	+0.5	+65.3	- 1.8	+ 94.6	- 1.8	+106.4	- 7.3	+ 95.3	+ 6.0
10	0.0	+0.3	+70.3	-15.5	+ 90.9	-22.2	+ 82.0	-22.8	+ 54.7	- 0.8
	EV 129.9				EH 51.5			ES 136.3		

Fifty-shot group. Mean from center of bull's-eye, 69.1. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 86.7.

Burst No.	First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Date: 9 July 1964.					Rifleman: G. Hendricks.					
1	+0.1	-0.3	+40.0	+ 7.4	+ 41.1	+12.8	+ 45.0	-10.8	+ 42.6	- 23.3
2	-1.0	-0.3	+44.0	- 0.2	+ 40.7	+17.7	+ 39.5	+13.5	+ 33.4	+ 13.7
3	-1.0	-0.7	+51.8	+ 2.7	+ 38.9	+ 9.7	+ 39.9	- 5.7	+ 35.1	- 11.8
4	-0.9	-0.6	+42.2	+ 0.2	+ 42.8	+ 5.8	+ 43.5	- 8.3	+ 42.7	- 8.8
5	-0.2	-1.0	+44.2	- 0.5	+ 50.1	+ 6.0	+ 42.7	+ 2.8	+ 46.3	- 1.5
6	-1.7	-1.4	+51.5	- 4.1	+ 67.4	- 2.9	+ 66.7	-18.2	+ 73.9	- 3.1
7	-0.9	-0.7	+40.7	- 3.4	+ 50.4	+ 0.9	+ 54.0	-10.5	+ 48.9	- 2.8
8	-1.2	+0.1	+49.0	-10.2	+ 52.7	- 7.3	+ 55.6	-13.4	+ 55.7	- 12.6
9	-1.9	+0.1	+43.8	+ 0.9	+ 48.5	+ 6.1	+ 51.9	+ 0.6	+ 56.2	+ 0.4
10	-1.7	+0.2	+55.7	- 0.6	+ 66.6	+14.0	+ 68.3	+ 7.4	+ 81.4	+ 6.6
	EV 83.3				EH 41.0			ES 83.5		

Fifty-shot group. Mean from center of bull's-eye, 40.1. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 50.9.

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
	Rifle: 5.56-mm, M16, No. 040219.									
	Cartridge: Ball, caliber .223, lot RA 5027.									
	Firing Position: Prone.									
	Range: 50 meters.									
	Date: 30 June 1964.					Rifleman: R. Connolly.				
1	-0.2	+0.2	+51.4	+ 0.6	+ 74.3	+ 4.1	+ 57.4	-13.8	+ 58.3	-21.0
2	+0.1	+0.3	+41.7	- 6.8	+ 58.7	- 4.8	+ 43.7	-18.7	+ 48.7	-15.0
3	-0.5	-0.2	+76.4	-13.9	+ 90.7	- 8.6	+ 82.8	-19.4	+ 85.7	-33.4
4	+0.6	-1.2	+84.7	+ 7.5	+ 96.6	- 1.7	+ 60.8	-14.2	+ 83.3	+ 1.0
5	-0.6	-0.7	+95.0	+12.9	+ 98.4	+ 1.2	+ 61.2	-12.2	+ 95.4	+ 7.9
6	-0.9	-1.2	+95.3	- 4.5	+110.9	- 9.8	+ 77.1	-18.2	+ 99.1	-14.8
7	+0.4	-1.4	+75.0	- 3.7	+ 98.3	- 5.3	+ 68.5	-14.9	+ 71.6	-20.2
8	-1.3	-1.4	+80.0	-21.9	+100.2	-22.0	+ 58.2	-23.7	+ 69.3	-37.5
9	-0.1	-0.6	+107.9	-15.9	+115.1	-21.6	+ 77.0	-25.8	+101.6	-25.1
10	-2.0	-1.1	+ 74.3	-16.0	+ 84.2	-13.4	+ 50.7	-22.7	+ 75.9	-30.8
	EV 117.1			EH 58.8				ES 118.4		

Fifty-shot group. Mean from center of bull's-eye, 63.8. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 79.9.

	Date: 6 July 1964.					Rifleman: L. Staley.				
1	-1.1	+0.2	+ 52.8	+ 4.2	+ 69.3	+ 2.8	+ 89.0	-13.9	+ 84.4	-12.6
2	-0.3	+0.4	+ 46.1	+ 1.9	+ 62.6	- 9.0	+ 85.8	-23.7	+ 84.5	-23.4
3	+0.6	-0.6	+ 41.9	+ 5.0	+ 60.8	+ 5.9	+ 78.8	+ 0.6	+ 82.7	- 0.1
4	-0.1	0.0	+ 52.8	- 1.4	+ 74.1	- 2.4	+ 88.0	- 1.6	+ 90.7	+ 9.6
5	-0.2	+0.5	+ 45.8	+ 5.6	+ 64.8	+ 5.9	+ 69.1	+ 5.9	+ 60.5	+15.1
6	-0.5	+0.2	+ 48.4	+ 2.4	+ 68.7	+ 1.9	+ 76.4	- 4.2	+ 68.1	+ 2.4
7	-0.2	-1.0	+ 38.4	+ 5.5	+ 77.6	+12.7	+ 78.7	+ 8.2	+ 62.0	+10.0
8	-1.2	-0.1	+ 39.5	+ 3.0	+ 58.1	- 1.3	+ 72.5	+ 0.1	+ 68.1	+ 7.2
9	-0.5	0.0	+ 43.2	+ 3.7	+ 65.4	+ 4.2	+ 73.0	- 2.2	+ 70.9	+ 5.5
10	-0.3	+0.5	+ 39.3	+ 8.2	+ 61.5	+12.8	+ 64.0	+22.9	+ 62.1	+34.8
	EV 91.9			EH 58.5				ES 92.3		

Fifty-shot group. Mean from center of bull's-eye, 53.2. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 66.7.

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Date: 9 July 1964.						Rifleman: G. Hendricks.				
1	+0.1	-0.2	+ 47.6	- 0.1	+ 51.4	+ 8.4	+38.6	+ 9.3	+ 33.4	+14.9
2	-0.5	-0.8	+ 48.0	- 0.9	+ 48.8	+ 6.2	+49.4	+ 1.6	+ 47.5	+ 7.2
3	+1.1	-1.4	+ 47.4	- 1.1	+ 49.9	+ 7.0	+46.8	+ 5.1	+ 50.2	+ 3.4
4	+0.7	-1.2	+ 50.5	- 5.9	+ 61.0	- 4.0	+62.5	-10.5	+ 63.2	- 8.3
5	+0.5	-2.0	+ 45.4	- 6.0	+ 45.2	+ 1.3	+50.0	- 7.6	+ 46.5	- 0.9
6	-0.2	-0.7	+ 44.0	+ 0.6	+ 43.2	+ 2.7	+43.8	- 2.4	+ 39.2	- 2.5
7	-1.8	-1.0	48.9	- 8.5	+ 50.0	- 3.7	+53.4	- 6.0	+ 49.4	- 5.6
8	-0.8	-1.2	+ 44.1	- 2.5	+ 47.9	+11.0	+53.3	+ 3.8	+ 54.4	+ 9.2
9	+0.1	-0.8	+ 45.1	- 3.4	+ 55.1	+10.5	+70.2	+17.5	+ 72.5	+24.7
10	-0.2	+0.2	+ 49.5	- 4.0	+ 56.1	+ 3.7	+58.8	- 0.6	+ 58.1	- 7.2
	EV 74.3			EH 35.2			ES 78.3			

Fifty-shot group. Mean from center of bull's-eye, 41.1. Mean for shots fired automatically (measured from the center of impact of the first round to the second, third, fourth, and fifth rounds), 51.2.

Rifle: 5.56-mm, M16, No. 040250.
Cartridge: Ball, caliber .223, lot RA 5027.
Firing Position: Prone.
Range: 50 meters.

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Date: 30 June 1964.						Rifleman: R. Connolly.				
1	+0.6	-1.0	+ 93.7	- 0.3	+106.8	- 4.4	+67.8	-12.3	+ 96.6	-12.1
2	+1.1	+0.9	+119.3	- 0.3	+124.0	-13.2	+73.3	-17.5	+113.7	+ 0.3
3	+1.4	+0.4	+ 88.5	+17.2	+116.1	+ 1.9	+85.5	-12.3	+ 86.4	+16.7
4	-0.4	+0.5	+ 83.1	+20.0	+ 96.8	+ 4.8	+62.5	-12.1	+ 78.5	+17.3
5	0.0	+0.7	+ 80.6	+16.1	+ 98.9	+ 5.4	+65.0	-10.8	+ 75.5	+ 9.4
6	-0.5	+1.4	+ 90.6	+24.8	+104.6	+ 8.0	+73.4	- 8.0	+ 94.6	+ 6.8
7	-0.2	-0.2	+ 99.2	+19.5	+109.4	- 0.8	+68.2	-10.9	+ 92.9	+31.6
8	+0.6	+0.7	+104.6	+11.0	+119.0	- 7.4	+82.8	-13.3	+102.6	+ 8.9
9	+0.5	+1.7	+ 82.9	+22.2	+ 93.6	+ 7.2	+56.4	- 9.3	+ 81.7	+18.6
10	-0.2	-0.1	+ 72.4	+11.8	+ 77.6	- 3.2	+56.4	-13.4	+ 82.8	+11.3
	EV 124.2			EH 49.1			ES 124.2			

Fifty-shot group. Mean from center of bull's-eye, 71.4. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 89.6.

Burst No.	Distance from Center of Bull's-Eye to First Shot Vert	First Shot Hor	Second Shot Vert	Second Shot Hor	Third Shot Vert	Third Shot Hor	Fourth Shot Vert	Fourth Shot Hor	Fifth Shot Vert	Fifth Shot Hor
Date:	6 July 1964.					Rifleman:	L. Staley.			
1	-1.0	+0.6	+46.7	+10.9	+ 70.1	+14.7	+ 88.0	+ 7.6	+ 95.4	+ 3.8
2	-0.1	-0.1	+55.9	+ 4.9	+ 83.2	+ 6.2	+ 99.1	- 6.0	+ 87.7	- 3.2
3	-1.3	+0.9	+57.4	+ 0.4	+ 84.3	- 3.9	+103.2	-16.4	+ 97.6	-20.8
4	-0.8	+0.2	+59.0	- 4.4	+ 80.3	- 6.9	+ 94.1	-19.8	+ 95.6	-23.3
5	+0.3	+0.1	+69.6	- 4.4	+106.7	- 4.7	+110.3	- 4.5	+102.0	+ 3.8
6	+1.3	-0.8	+64.1	- 4.2	+102.9	- 6.3	+123.0	-13.7	+114.1	- 9.5
7	-0.7	+2.1	+62.5	+ 1.4	+ 88.2	+ 2.1	+101.0	+14.6	+ 93.3	+27.1
8	0.0	+0.7	+57.6	+ 0.1	+ 87.0	- 1.7	+102.8	- 6.8	+109.6	- 9.6
9	-0.1	+0.4	+54.6	- 3.5	+ 81.4	- 6.7	+101.0	-23.5	+105.9	-25.9
10	+0.1	-0.9	+58.9	+ 0.3	+ 80.8	-10.6	+ 95.0	-25.4	+ 97.9	-22.8
	EV 124.3			EH 53.0			ES 124.9			

Fifty-shot group. Mean from center of bull's-eye, 70.1. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 87.6.

Date:	9 July 1964.					Rifleman:	G. Hendricks.			
1	-0.1	-0.4	+38.2	- 2.1	+ 45.3	+10.4	+ 45.3	+12.8	+ 39.6	+10.2
2	+0.4	-0.4	+51.0	- 5.5	+ 50.3	+ 1.8	+ 41.0	+ 1.4	+ 32.5	+ 5.3
3	-0.2	-0.7	+47.3	- 1.6	+ 48.2	+10.0	+ 44.3	+12.1	+ 38.3	+21.1
4	-0.8	-1.0	+52.8	- 0.8	+ 58.8	+ 6.2	+ 53.3	+ 8.4	+ 51.8	+ 8.2
5	0.0	-0.1	+59.3	- 2.3	+ 55.3	+ 5.2	+ 40.0	+ 7.0	+ 46.2	+ 9.3
6	-0.9	+0.1	+50.1	- 8.3	+ 49.9	- 1.5	+ 47.5	- 2.8	+ 46.2	+ 1.9
7	-0.9	-0.8	+46.3	+ 1.4	+ 43.0	+12.8	+ 37.4	+15.5	+ 37.2	+21.7
8	-0.5	-1.3	+53.5	- 0.6	+ 58.1	+13.0	+ 57.2	+16.0	+ 56.9	+16.8
9	-1.2	-0.4	+54.9	- 3.2	+ 57.3	+ 3.1	+ 49.0	+ 1.9	+ 42.8	+ 5.5
10	-1.2	-0.2	+54.0	- 2.2	+ 51.1	+ 4.9	+ 44.7	+ 2.7	+ 43.9	+ 0.8
	EV 60.5			EH 30.0			ES 60.8			

Fifty-shot group. Mean from center of bull's-eye, 40.2. Mean for shots fired automatically (measured from the center of impact of the first rounds to the second, third, fourth, and fifth rounds), 49.4.

APPENDIX VI - FINDINGS

Acceptance Testing Specification (SAPD-253, 18 July 1963) Requirement	Performance
Failures to fire semiautomatic (single rounds) not to exceed three (ref Table I of SAPD-253).	A total of five failures to fire semiautomatic were encountered with rifle No. 040297 in the reliability test (ref par. 2.13.3, Table XII).

43

AD _____ Accession No. _____

DAPG, Aberdeen Proving Ground, Maryland
Final Report of Comparison Test of Rifle, 5.56-MM, M16,
USATECOM Project No. 8-4-0230-01-F, October 1964, George E. Hendricks
RDT&E Project No. None, Report No. DPG-1471
83 pages, 2 illustrations

Unclassified Report

The purpose of this test was to determine if production-line samples of M16 rifles would comply with performance specifications; to detect any design, manufacturing, or inspection deficiencies; and to determine the accuracy and the ability of the rifle to function when subjected to automatic-fire roles and under various adverse conditions. The test was conducted between 26 May and 14 September 1964. The rifles produced satisfactory performance except that one rifle had an excessive number of failures to fire semiautomatically (single rounds) in the reliability test.

AD _____ Accession No. _____

DAPG, Aberdeen Proving Ground, Maryland
Final Report of Comparison Test of Rifle, 5.56-MM, M16
USATECOM Project No. 8-4-0230-01-F, October 1964, George E. Hendricks
RDT&E Project No. None, Report No. DPG-1471
83 pages, 2 illustrations

Unclassified Report

The purpose of this test was to determine if production-line samples of M16 rifles would comply with performance specifications; to detect any design, manufacturing, or inspection deficiencies; and to determine the accuracy and the ability of the rifle to function when subjected to automatic-fire roles and under various adverse conditions. The test was conducted between 26 May and 14 September 1964. The rifles produced satisfactory performance except that one rifle had an excessive number of failures to fire semiautomatically (single rounds) in the reliability test.

45